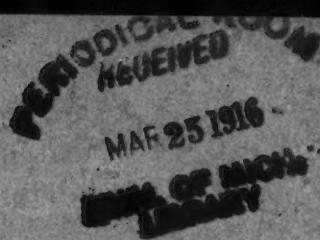


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# PROCEEDINGS

OF THE

## AMERICAN SOCIETY

OF

## CIVIL ENGINEERS

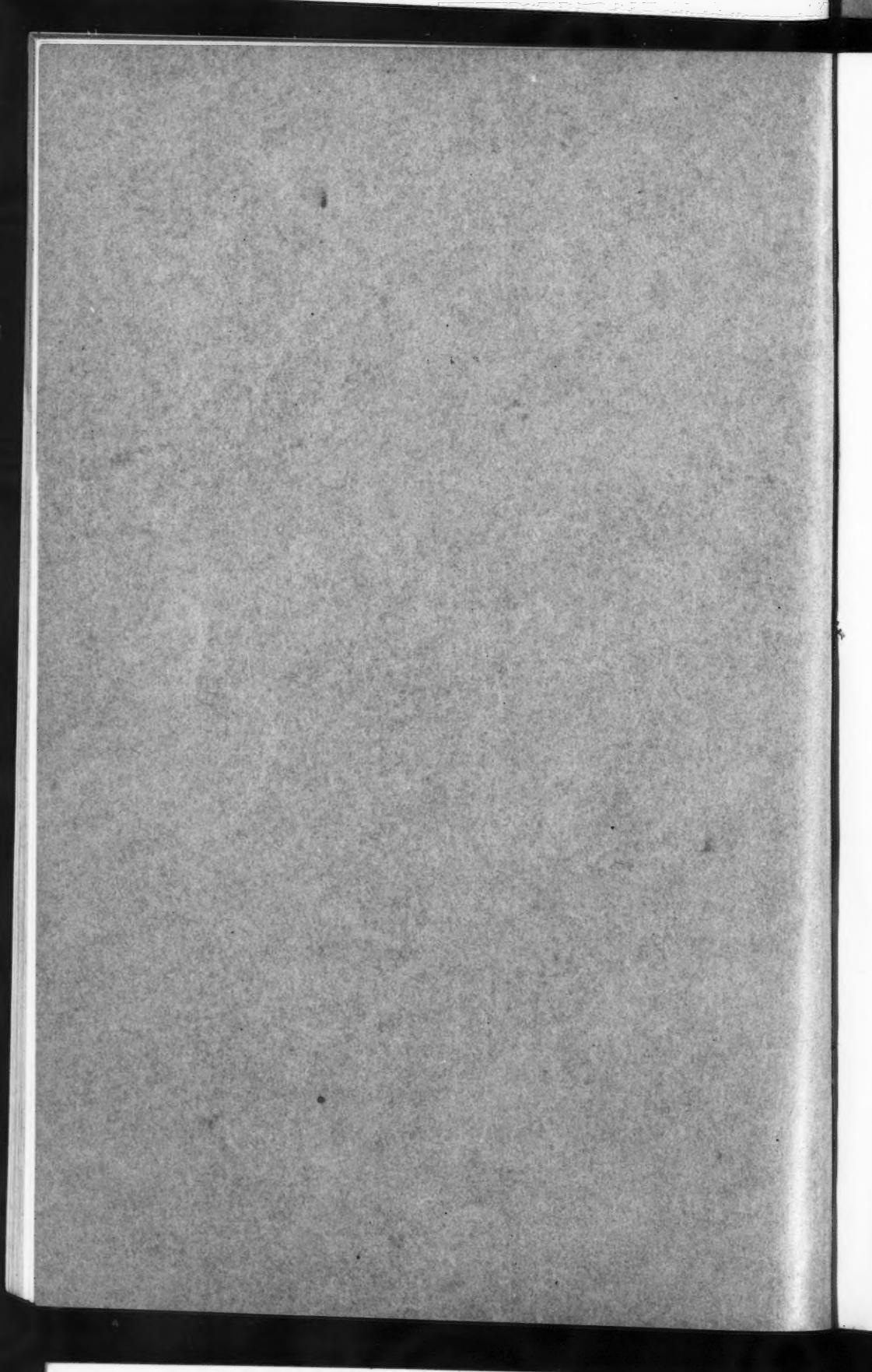
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PROCEEDINGS  
OF THE  
AMERICAN SOCIETY  
OF  
CIVIL ENGINEERS  
(INSTITUTED 1852)

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VOL. XLII—No. 3  
MARCH, 1916

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CONTENTS

Society Affairs.....	Pages 191 to 242.
Papers and Discussions.....	Pages 317 to 448.

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NEW YORK 1916

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# American Society of Civil Engineers

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TO INVESTIGATE CONDITIONS OF EMPLOYMENT OF, AND COMPENSATION OF, CIVIL ENGINEERS: Nelson P. Lewis, S. L. F. Deyo, Dugald C. Jackson, William V. Judson, George W. Tillson, C. F. Loweth, John A. Bensel.

TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edwin Duryea, Jr., E. G. Haines, Allen Hazen, James C. Meem, Walter J. Douglas.

ON A NATIONAL WATER LAW: F. H. Newell, George G. Anderson, Charles W. Comstock, Clemens Herschel, W. C. Hoad, Robert E. Horton, John H. Lewis, Charles D. Marx, Gardner S. Williams.

ON FLOODS AND FLOOD PREVENTION: C. McD. Townsend, John A. Bensel, T. G. Dabney, C. E. Grunsky, Morris Knowles, J. B. Lippincott, Daniel W. Mead, John A. Ockerson, Arthur T. Safford, Charles Saville, F. L. Sellew.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Robert W. Hunt, George W. Kittredge, Paul M. LaBach, C. G. E. Larsson, William McNab, G. J. Ray, Albert F. Reichmann, F. E. Turneaure, J. E. Willoughby.



The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER..... 1446 Circle.

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## AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

## PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed  
in its publications.

## SOCIETY AFFAIRS

## CONTENTS

	PAGE
Minutes of Meetings: Of the Society, February 16th, and March 1st, 1916.....	191
<b>Announcements:</b>	
Hours during which the Society House is open.....	193
Future Meetings.....	193
Annual Convention.....	193
Searches in the Library.....	193
Papers and Discussions.....	194
Local Associations of Members of the American Society of Civil Engineers.....	194
Minutes of Meetings of Special Committees.....	198
Privileges of Engineering Societies Extended to Members.....	199
<b>Accessions to the Library:</b>	
Donations.....	202
By purchase.....	205
Membership (Additions, Changes of Address, Resignations, Deaths).....	206
Recent Engineering Articles of Interest.....	214

**MINUTES OF MEETINGS  
OF THE SOCIETY**

**February 16th, 1916.**—The meeting was called to order at 8.30 p. m.; President Elmer L. Corthell in the chair; T. J. McMinn, Assistant Secretary, acting as Secretary; and present, also, 271 members and 33 guests.

A paper by A. B. Lueder, M. Am. Soc. C. E., and W. J. R. Wilson, Esq., entitled "Secure Subway Supports" was presented by Mr. Lueder and illustrated with lantern slides. The Assistant Secretary read a communication on the subject from H. G. Moulton, Esq., and the paper was discussed by Messrs. Richard A. Fiesel, J. H. O'Brien, Lazarus White, B. C. Collier, and A. B. Lueder.

The proposed movement of Society Headquarters was discussed by Messrs. Clemens Herschel, Alexander C. Humphreys, H. G. Stott, and the President.

The Assistant Secretary announced the following deaths:

ROBERT JAMES BEACH, of New York City, elected Member, May 2d, 1900; died February 7th, 1916.

WALTER FRANK CARR, of Seattle, Wash., elected Member, June 6th, 1894; died February 2d, 1916.

JOHN HOWARD JOHNSTON, of Nice, Alpes Maritimes, France, elected Member, March 1st, 1876; died in May, 1913.

WILLIAM JASPER NICOLLS, of Philadelphia, Pa., elected Member, June 5th, 1878; died February 14th, 1916.

GEORGE WAY SWINBURNE, of East Orange, N. J., elected Member, May 7th, 1902; died February 3d, 1916.

STEVENSON TOWLE, of New York City, elected Member, February 19th, 1868; died February 14th, 1916.

CHARLES PERKINS WEBBER, of Panuco, Ver., Mexico, elected Associate Member, October 7th, 1908; Member, January 7th, 1913; died January 30th, 1916.

Adjourned.

**March 1st, 1916.**—The meeting was called to order at 8.30 P. M.; J. O. Eckersley, M. Am. Soc. C. E., in the chair; T. J. McMinn, Assistant Secretary, acting as Secretary; and present, also, 116 members and 12 guests.

The minutes of the Annual Meeting, January 19th, and of the meeting of February 2d, 1916, were approved as printed in *Proceedings* for February, 1916.

A paper by Joseph W. Ellms, M. Am. Soc. C. E., and John S. Gettrust, Esq., entitled "A Study of the Behavior of Rapid Sand Filters Subjected to the High-Velocity Method of Washing", was presented by the Assistant Secretary, and discussed by Messrs. F. A. Barbour, Robert Spurr Weston, H. Malcolm Pirnie, and John H. Gregory, Messrs. Barbour and Weston illustrating their remarks with lantern slides. Written discussions on this paper by Messrs. F. H. Stephenson, George E. Willecomb, and George W. Fuller were presented by title.

A paper by Henry S. Prichard, M. Am. Soc. C. E., entitled "The Effects of Straining Structural Steel and Wrought Iron", was presented by the author, and discussed by Ernst F. Jonson, Assoc. M. Am. Soc. C. E. Written discussions on this paper by Messrs. J. A. L. Waddell, C. A. P. Turner, H. F. Moore, Henry B. Seaman, J. A. McCulloch, F. N. Speller, James E. Howard, and T. D. Lynch were presented by title.

The Assistant Secretary announced the following deaths:

THOMAS FRANCIS MCCRICKETT, of Detroit, Mich., elected Member, January 2d, 1907; died January 26th, 1916.

GEORGE WASHINGTON VAUGHN, of Leavenworth, Kans., elected Member, June 3d, 1891; died February 3d, 1916.

CURTISS MILLARD, of North Egremont, Mass., elected Junior, April 3d, 1889; died February 16th, 1916.

Adjourned.

### ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

### FUTURE MEETINGS

**April 5th, 1916.—8.30 P. M.**—This will be a regular business meeting. A paper by A. C. Janni, M. Am. Soc. C. E., entitled "Method of Designing a Rectangular Reinforced Concrete Flat Slab, Each Side of Which Rests on Either Rigid or Yielding Supports", will be presented for discussion.

This paper was printed in *Proceedings* for February, 1916.

**April 19th, 1916.—8.30 P. M.**—At this meeting a paper by James B. Hays, Jun. Am. Soc. C. E., entitled "Designing an Earth Dam Having a Gravel Foundation, with the Results Obtained in Tests on a Model", will be presented for discussion.

This paper is printed in this number of *Proceedings*.

### ANNUAL CONVENTION

The Forty-eighth Annual Convention of the Society will be held at Pittsburgh, Pa., from June 27th to 30th, 1916, inclusive.

Arrangements for the Convention are in the hands of the following Local Committee:

GEORGE S. DAVISON, *Chairman*,

J. A. ATWOOD,

D. W. MCNAUGHER,

R. A. CUMMINGS,

EMIL SWENSSON,

RICHARD KHUEN,

E. B. TAYLOR,

MORRIS KNOWLES,

W. G. WILKINS,

PAUL L. WOLFEL.

### SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

It sometimes happens that references are found which are not readily accessible to the person for whom the search is made. In that case the material may be reproduced by photography, and this can be done for members at the cost of the work to the Society, which is small. This method is particularly useful when there are drawings or figures in the text, which would be very expensive to reproduce by hand.

#### PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which, from their mathematical or technical nature, in the opinion of the Committee, are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 429 of the August, 1913, *Proceedings*.

#### LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

##### San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Tuesday of February, April,

June, August, and October, and the third Friday of December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 p. m., every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

#### Colorado Association

The meetings of the Colorado Association of Members of the American Society of Civil Engineers (Denver, Colo.) are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, L. R. Hinman, 1400 West Colfax Ave., Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, at 12.30 p. m., at Clarke's Restaurant, 1632 Champa Street.

Visiting members are urged to attend the meetings and luncheons.

#### (Abstract of Minutes of Meeting)

**January 15th, 1916.**—The meeting was called to order at the Denver Athletic Club; President John E. Field in the chair; L. R. Hinman, Secretary; and present, also, 21 members and 7 guests.

The minutes of the meeting of November 13th, 1915, were read and approved.

The resignations of Messrs. A. G. Allan and H. V. Knouse, as members of the Association, were accepted.

The matter of the Luncheon Postal Notice was discussed, and on motion, duly seconded, a vote was taken, resulting in a decision to discontinue such notice.

Mr. L. B. Curtis addressed the meeting on the subject of the "Hydro-Electric Development of the Nevada-California Power Corporation", illustrating his remarks with lantern slides, and the subject was informally discussed by those present.

On motion, duly seconded, a vote of thanks was extended to Mr. Curtis for his address.

Adjourned.

#### Atlanta Association

The Atlanta Association of Members of the American Society of Civil Engineers was organized on March 14th, 1912. The Association holds its meetings at the University Club, Atlanta, Ga.

At the meeting of the Association on January 9th, 1915, the following officers were elected for the ensuing year: President, Park A. Dallis; First Vice-President, B. M. Hall; Second Vice-President, P. H. Norcross; Secretary-Treasurer, T. B. Branch.

**Baltimore Association**

The Baltimore Association of Members of the American Society of Civil Engineers was organized on May 6th, 1914, and the proposed Constitution was approved by the Board of Direction at its meeting of September 2d, 1914.

At the meeting of the Association on May 5th, 1915, the following officers were elected: President, Thomas D. Pitts; Secretary-Treasurer, Charles J. Tilden; Directors, J. E. Greiner, C. W. Hendrick, B. P. Harrison, B. T. Fendall, Mason D. Pratt, R. Keith Compton, R. B. Morse, and H. G. Shirley.

**Cleveland Association**

The proposed Constitution of the Cleveland Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on January 6th, 1915.

At the meeting of the Association on December 18th, 1915, the following officers were elected for the ensuing year: President, Robert Hoffmann; Vice-President, Wilbur J. Watson; and Secretary-Treasurer, George H. Tinker.

**Louisiana Association**

At the meeting of the Louisiana Association of Members of the American Society of Civil Engineers (New Orleans, La.), on April 14th, 1915, the following officers were elected for the ensuing year: J. F. Coleman, President; W. B. Gregory and A. M. Shaw, Vice-Presidents; Ole K. Olsen, Treasurer; and E. H. Coleman, Secretary.

**Northwestern Association**

The proposed Constitution of the Northwestern Association of Members of the American Society of Civil Engineers (St. Paul and Minneapolis, Minn.) was considered and approved by the Board of Direction of the Society on November 4th, 1914.

The officers of the Association are as follows: President, W. L. Darling; First Vice-President, George L. Wilson; Second Vice-President, L. W. Rundlett; Secretary, R. D. Thomas; and Treasurer, A. F. Meyer.

**Philadelphia Association**

The meetings of the Philadelphia Association of Members of the American Society of Civil Engineers are held at the Engineers' Club of Philadelphia, 1317 Spruce Street.

The officers of the Association are as follows: President, Edward B. Temple; Vice-Presidents, Edgar Marburg and John Sterling Deans; Directors, J. W. Ledoux, H. S. Smith, Henry H. Quimby, and George A. Zinn; Past-Presidents, George S. Webster and Richard L. Humphrey; Treasurer, S. M. Swaab; and Secretary, W. L. Stevenson.

**Portland, Ore., Association**

At the Annual Meeting of the Association on September 28th, 1915, the following officers were elected for the ensuing year: President, J. P. Newell; First Vice-President, John T. Whistler; Second Vice-

President, E. B. Thomson; Treasurer, Russell Chase; and Secretary, J. A. Currey.

#### St. Louis Association

The proposed Constitution of the St. Louis Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on October 7th, 1914.

The following officers have been elected: President, J. A. Ockerson; First Vice-President, Edward E. Wall; Second Vice-President, F. J. Jonah; Secretary-Treasurer, Gurdon G. Black. The meetings of the Association are held at the Engineers' Club Auditorium.

#### San Diego Association

The San Diego Association of Members of the American Society of Civil Engineers was organized on February 5th, 1915, and officers have been elected, as follows: President, George Butler; Vice-President, Willis J. Dean; and Secretary-Treasurer, J. R. Comly.

At its meeting of September 20th, 1915, the Board of Direction considered and approved the proposed Constitution of the San Diego Association of Members of the American Society of Civil Engineers.

#### Seattle Association

The Seattle Association of Members of the American Society of Civil Engineers was organized on June 30th, 1913.

The officers of the Association for 1916 are as follows: President, A. O. Powell; Vice-President, Joseph Jacobs; and Secretary-Treasurer, Carl H. Reeves.

#### (Abstract of Minutes of Meeting)

**January 31st, 1916.**—The Annual Meeting was called to order at 7.00 p. m., at the College Club; President R. H. Ober in the chair; Carl H. Reeves, Secretary; and present, also, 52 members and guests.

The Report of the Secretary-Treasurer for 1915, showing an increase of 14 in membership and a cash balance of \$79.32, was read and approved.

President Ober, in a brief address, reviewed the work of the Association during 1915, and then introduced the guest of honor, Charles H. Rust, M. Am. Soc. C. E., who presented a paper on "The New Water Supply of Victoria", illustrating his remarks with stereopticon views.

The minutes of the meeting of December 27th, 1915, were read and approved.

Communications from the Pacific Northwest Society of Engineers, in re its meeting of February 5th, 1916; from Mr. F. W. D. Holbrook, in re his election as an Honorary Member of the Association; and from the Secretary of the Portland, Ore., Association, in re competition for plans for the Inter-County Bridge at Salem, Ore., were presented.

On motion, duly seconded, the President-elect was ordered to appoint a committee, consisting of himself and four other members of the Association, to care for and entertain members of the Society while sojourning in Seattle during the coming year.

Mr. F. T. Crowe addressed the meeting briefly.

The officers of the Association for 1916 were elected, as follows: President, A. O. Powell; Vice-President, Joseph Jacobs; and Secretary-Treasurer, Carl H. Reeves.

On motion, duly seconded, the auditing of the books of the Secretary-Treasurer was waived.

Messrs. R. H. Thomson and S. H. Hedges were appointed a Committee to escort Mr. Powell, the President-elect, to the chair, after which brief addresses were made by Messrs. S. H. Hedges, W. E. Herring, G. R. Hawes, L. M. Grant, L. V. Branch, Joseph Jacobs, and R. H. Thomson.

Adjourned.

#### Southern California Association

The Southern California Association of Members of the American Society of Civil Engineers (Los Angeles, Cal.) holds regular bi-monthly meetings, with banquet, on the second Wednesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 p. m. every Wednesday, and the place of meeting may be ascertained from the Secretary of the Association, W. K. Barnard, 701 Central Building, Los Angeles, Cal.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

The officers of the Association for 1916, are as follows: President, William Mulholland; First Vice-President, H. Hawgood; Second Vice-President, L. C. Hill; Secretary, W. K. Barnard; and Treasurer, C. H. Lee.

#### Spokane Association

The proposed Constitution of the Spokane Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on March 4th, 1914. Ulysses B. Hough is President.

#### Texas Association

The proposed Constitution of the Texas Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on December 31st, 1913. The headquarters of the Association is Dallas, Tex. John B. Hawley is President.

#### MINUTES OF MEETINGS OF SPECIAL COMMITTEES TO REPORT UPON ENGINEERING SUBJECTS

##### Special Committee on Steel Columns and Struts

**January 20th, 1916.**—The meeting was called to order at 10 a. m. at the House of the Society. Present, George H. Pagram (Chairman), James H. Edwards, Charles F. Loweth, Rudolph P. Miller, Ralph Modjeski, George F. Swain, and Lewis D. Rights (Secretary). There

were also present Dr. Olshausen, representing the U. S. Government Bureau of Standards, and W. H. Moore, M. Am. Soc. C. E., representing the Steel Column Sub-Committee of the American Railway Engineering Association. C. G. E. Larsson, M. Am. Soc. C. E., of the American Bridge Company, was also present.

The minutes of the meeting of November 19th, 1915, were approved.

Mr. Edwards reported that all the material for the supplementary test programme had been shipped from the shop of the American Bridge Company, and Dr. Olshausen stated that a portion had been received at Washington and delivered to the Bureau of Standards.

Mr. Swain was continued as a committee of one to confer further with Col. Wheeler, of Watertown Arsenal, in reference to the column tests which are being conducted there.

Mr. Worcester (who was not present) was appointed a committee of one to elaborate the discussion which he submitted under the heading "Factor of Safety", and the members of the Committee were requested to send in their discussions on the subject before February 15th, 1916.

Messrs. Edwards and Swain, and Dr. Olshausen were appointed a committee to arrange for making the tests on the columns in the supplementary programme. Considerable discussion was brought out as to how these tests should be carried out.

The Chairman and the Secretary were authorized to make a budget for the ensuing year and submit it to the Board of Direction for approval.

It was decided to hold the next meeting in Washington, D. C., at some date near April 1st, to be determined by the Chairman.

#### **PRIVILEGES OF ENGINEERING SOCIETIES EXTENDED TO MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS**

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms, and at all meetings:

**American Institute of Electrical Engineers**, 33 West Thirty-ninth Street, New York City.

**American Institute of Mining Engineers**, 29 West Thirty-ninth Street, New York City.

**American Society of Mechanical Engineers**, 29 West Thirty-ninth Street, New York City.

**Architekten-Verein zu Berlin**, Wilhelmstrasse 92, Berlin W. 66, Germany.

**Associação dos Engenheiros Civis Portuguezes**, Lisbon, Portugal.

**Australasian Institute of Mining Engineers**, Melbourne, Victoria, Australia.

**Boston Society of Civil Engineers**, 715 Tremont Temple, Boston, Mass.

**Brooklyn Engineers' Club**, 117 Remsen Street, Brooklyn, N. Y.

- Canadian Society of Civil Engineers**, 176 Mansfield Street, Montreal, Que., Canada.
- Civil Engineers' Society of St. Paul**, St. Paul, Minn.
- Cleveland Engineering Society**, Chamber of Commerce Building, Cleveland, Ohio.
- Cleveland Institute of Engineers**, Middlesbrough, England.
- Dansk Ingeniorforening**, Amaliegade 38, Copenhagen, Denmark.
- Detroit Engineering Society**, 46 Grand River Avenue, West, Detroit, Mich.
- Engineers and Architects Club of Louisville**, 1412 Starks Building, Louisville, Ky.
- Engineers' Club of Baltimore**, 6 West Eager Street, Baltimore, Md.
- Engineers' Club of Kansas City**, E. B. Murray, Secretary, 920 Walnut Street, Kansas City, Mo.
- Engineers' Club of Minneapolis**, 17 South Sixth Street, Minneapolis, Minn.
- Engineers' Club of Philadelphia**, 1317 Spruce Street, Philadelphia, Pa.
- Engineers' Club of St. Louis**, 3817 Olive Street, St. Louis, Mo.
- Engineers' Club of Toronto**, 96 King Street, West, Toronto, Ont., Canada.
- Engineers' Club of Trenton**, Trent Theatre Building, 12 North Warren Street, Trenton, N. J.
- Engineers' Society of Northeastern Pennsylvania**, 415 Washington Avenue, Scranton, Pa.
- Engineers' Society of Pennsylvania**, 31 South Front Street, Harrisburg, Pa.
- Engineers' Society of Western Pennsylvania**, 2511 Oliver Building, Pittsburgh, Pa.
- Institute of Marine Engineers**, The Minories, Tower Hill, London, E., England.
- Institution of Engineers of the River Plate**, Calle 25 de Mayo 195, Buenos Aires, Argentine Republic.
- Institution of Naval Architects**, 5 Adelphi Terrace, London, W. C., England.
- Junior Institution of Engineers**, 39 Victoria Street, Westminster, S. W., London, England.
- Koninklijk Instituut van Ingenieurs**, The Hague, The Netherlands.
- Louisiana Engineering Society**, State Museum Building, Chartres and St. Ann Streets, New Orleans, La.
- Memphis Engineers' Club**, Memphis, Tenn.
- Midland Institute of Mining, Civil and Mechanical Engineers**, Sheffield, England.
- Montana Society of Engineers**, Butte, Mont.
- North of England Institute of Mining and Mechanical Engineers**, Newcastle-upon-Tyne, England.

- Oesterreichischer Ingenieur- und Architekten-Verein**, Eschenbachgasse 9, Vienna, Austria.
- Oregon Society of Civil Engineers**, Portland, Ore.
- Pacific Northwest Society of Engineers**, 312 Central Building, Seattle, Wash.
- Rochester Engineering Society**, Rochester, N. Y.
- Sachsenischer Ingenieur- und Architekten-Verein**, Dresden, Germany.
- Sociedad Colombiana de Ingenieros**, Bogota, Colombia.
- Sociedad de Ingenieros del Peru**, Lima, Peru.
- Societe des Ingénieurs Civils de France**, 19 rue Blanche, Paris, France.
- Society of Engineers**, 17 Victoria Street, Westminster, S. W., London, England.
- Svenska Teknologforeningen**, Brunkebergstorg 18, Stockholm, Sweden.
- Tekniske Forening**, Vestre Boulevard 18-1, Copenhagen, Denmark.
- Western Society of Engineers**, 1737 Monadnock Block, Chicago, Ill.

## ACCESSIONS TO THE LIBRARY

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#### **UEBER GESCHICHTE UND BAU DES PANAMA-KANALES.**

Von K. E. Hilgard, M. Am. Soc. C. E. Paper,  $9\frac{1}{4}$  x  $6\frac{1}{2}$  in., illus., 113 pp. Zürich, Art. Institut Orell Füssli. 6 Marks.

The subject-matter of this book is said to have been first used by the author as a lecture before various scientific and technical societies in different cities and towns in Switzerland, and is, therefore, necessarily limited in scope. After a short history of the Panama Canal, the author describes the most essential parts of its construction and operation, including the sanitation of the Canal Zone, the various kinds of machinery used and its application to the work, the labor organization and housing problems, the dams, locks, and slides, etc. He includes the total costs of construction and a comparison of the trade and political importance of the Canal to North America and the rest of the world. The text is fully illustrated by maps, graphical tables, and official photographs, and the author has also given a short bibliography of recent literature pertaining to the subject. The Chapter headings are: Kurzer Ueberblick der Geschichte des Kanales; Allgemeine Beschreibung des Kanales, das allgemeine Technische sowie Sonderprobleme des Kanalbaues und die Kanalzone, Organisation der Kanalcommission; Hygiene und Sanierung der Kanalzone; Die einzelnen Bauten; Die wichtigsten Arbeitsmaschinen und wesentlichsten Arbeitsleistungen; Die Arbeiter-und Lebensverhältnisse; Die Vollendung des Kanales und die Sicherung seines Betriebes, seitherige Rutschungen im Culebra-Einschnitt; Die Erbauer des Kanales; Bedenken und Einwendungen gegen die erfolgreiche Vollendung und Benutzung des Kanales; Vergleich des Panama-Kanales mit einigen anderen Meereskanalen; Die Bedeutung des Panama-Kanales für Nord-Amerika und den Weltverkehr; Baukosten und Schluss; Einige Angaben über neuere einschlägige Literatur; Verzeichnis der graphischen Beilagen und Abbildungen.

#### **DAMS AND WEIRS:**

An Analytical and Practical Treatise on Gravity Dams and Weirs; Arch and Buttress Dams; Submerged Weirs; and Barrages. By W. G. Bligh, M. Am. Soc. C. E. Cloth,  $8\frac{1}{2}$  x  $5\frac{1}{4}$  in., illus., 206 pp. Chicago, American Technical Society, 1915. (Donated by the Author.)

The great progress made in recent years in dam and weir construction, by reason of the vast irrigation and power projects which have been undertaken by the various Governments and hydro-electric companies, and the use of reinforced concrete as a standard material for building such dams, has served, it is stated, to multiply the types of design and increased the need of a brief but authoritative work on the subject. The author, it is said, has designed and built weirs and dams in India, Egypt, Canada, and the United States, and is, therefore, qualified to discuss the subject, not only from its historic side, but from the modern practical side as well. In addition to a careful analysis of each modern type of profile, he has given, it is stated, critical studies of examples of each type, showing the good and bad points of the design. He has also included a number of practical problems and their solution, using both the graphical and analytical methods, the former method being explained in detail as occasion demands. Numerous drawings and photographs have also been used to illustrate the text. The Chapter headings are: Gravity Dams; Design of Dams; Unusually High Dams; Notable Existing Dams; Special Foundations; Gravity Overfall Dams or Weirs; Arched Dams; Multiple Arch or Hollow Arch Buttress Dams; Hollow Slab Buttress Dams; Submerged Weirs Founded on Sand; Open Dams or Barrages; Index.

#### **IRRIGATION PRACTICE AND ENGINEERING:**

Volume III, Irrigation Structures and Distribution System. By B. A. Etcheverry, Assoc. M. Am. Soc. C. E. Cloth,  $9\frac{1}{4}$  x  $6\frac{1}{2}$  in., illus., 15 + 438 pp. New York and London, McGraw-Hill Book Company, Inc., 1916. \$4.00.

In Volumes I and II of this work, the author has discussed the Use of Irrigation Water and the Conveyance of Water, respectively, and, in this (the third and last) volume, he describes, in Chapters I to VII, the various structures, and, in Chapters VIII to XIII, the distribution system, used in irrigation practice. The preface states that Volumes II and III are essentially devoted to a presentation of the fundamental

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\* Unless otherwise specified, books in this list have been donated by the publishers.

principles and problems of irrigation engineering, and, although intended as textbooks for use in technical schools, sufficient descriptive matter and cost data have been added to make them valuable as reference books for engineers engaged in the construction and operation of irrigation systems. As presented in these two volumes, the subject-matter, it is said, is confined largely to canals and other works pertaining to the usual types of irrigation systems. No attempt has been made, it is stated, to discuss the subject of dams for the storage of water or high masonry dams for diversion purposes, but detailed descriptions of low dams for diversion weirs are included. The book is illustrated with many drawings and photographs of constructed works, and at the end of each chapter tabulated references are given to other works pertaining to the subject discussed in that chapter. The Contents are: Diversions Works; Scouring Sluices, Fish Ladders, Logways; Main Headgates or Regulator for Canal System; Canal Spillways, Escapes and Wasteways; Sand Gates, Sand Boxes; Crossings with Drainage Channels; Drops and Chutes in Canals; Distribution System; Check Gates; Lateral Headgates and Delivery Gates; Road and Railroad Crossings with Canals, Culverts, Inverted Siphons and Bridges; Special Types of Distribution Systems; Wooden Flume, Wooden Pipe, and Cement Pipe Distribution Systems; Measuring Devices; Index.

#### MUNICIPAL FREEDOM:

A Study of the Commission Government. By Oswald Ryan. With an Introduction by A. Lawrence Lowell. (The American Books.) Cloth,  $7\frac{1}{4}$  x 5 in., 16 + 233 pp. New York, Doubleday, Page & Company, 1915. 60 cents.

The Commission Government, the author states, has had a larger share of consideration at the hands of charter reformers and students of government than any other single measure of municipal reform, and his aim in this book, it is said, is to discuss the possibilities and efficiencies of the plan in relation to its future adoption as the prevailing municipal system in the United States, rather than to relate the story of various commission governments. The subject-matter, it is stated, is based largely on the author's personal investigations in various cities of the United States since 1910, and in the Appendix he has included the Des Moines Plan of commission government, as provided by the Iowa Commission Government Act, the Commission-Manager Plan, as outlined in the Dayton, Ohio, Charter, and the Preferential Ballot, as provided in the charter of Grand Junction, Colo. He has also included a bibliography of selected references on the subject of Commission Government. The Contents are: The New Departure in Municipal Democracy; A Tale of Two Cities; Democracy and Efficiency; Fixing Responsibility; Changing Municipal Organization to Preserve Municipal Democracy; The Coming of the Burgomaster; Is the Party System Passing from the City?; Vitalizing the Ballot; Municipal Freedom; Appendix: The Des Moines Plan; The Commission-Manager Plan; Preferential Voting; Selected References on Commission Government.

#### INDUSTRIAL LEADERSHIP.

By H. L. Gantt. Cloth,  $7\frac{1}{4}$  x  $5\frac{1}{4}$  in., illus., 12 + 128 pp. New Haven, Yale University Press; London, Humphrey Milford; Cambridge University Press, 1916. \$1.00.

In a secondary title, it is stated that the subject-matter of this book is made up of the addresses delivered in the Page Lecture Series, 1915, before the Senior Class of the Sheffield Scientific School of Yale University. In these lectures the author, it is said, has attempted to indicate the organization and executive methods on which to establish an industrial democracy which will be more effective than any such system developed under autocracy. He emphasizes the importance of industrial leadership and the responsibility of engineering schools for training such leaders, the methods to be followed for the development and training of workmen, and the results obtained by such methods. One of the most important phases of the question discussed herein is said to be how far the State should go with industrial and vocational training. It is exceedingly important, it is stated, that the industries themselves give as much of such training as possible before the State takes up the work, and in his discussion, the author, it is said, shows how much they can accomplish by the methods outlined in these lectures and the good results to be obtained. The Contents are: Industrial Leadership; Training Workmen; Principles of Task Work; Results of Task Work; Production and Sales.

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**Valuation of Real Property**: A Guide to the Principles of Valuation of Lands and Buildings, etc., for Various Purposes, Including the Taxation of Land Values, with Numerous Examples. By Clarence A. Webb. Third Edition, Revised and Enlarged. By Arthur Hemmings. London, 1913.

**Formeln und Tabellen für den Eisenbau**, nebst den wichtigsten Hochbauvorschriften und Brückenverordnungen Preussens und Oesterreichs. Von Friedrich Bleich. Wien, 1915.

**Beton-Kalender, 1916**: Taschenbuch für Beton- u. Eisenbetonbau, sowie die verwandten Fächer. Unter Mitwirkung hervorragender Fachmänner, herausgegeben von der Zeitschrift *Beton u. Eisen*. XI. Jahrgang. 2. Vol. Berlin, 1915.

**The Utilities Magazine**; Vol. 1, No. 3, January, 1916: Proceedings of the Conference on Valuation. Philadelphia.

**Illustrierte technische Wörterbücher**: Unter Mitwirkung hervorragender Fachleute des In- und Auslandes. Herausgegeben von Alfred Schliemann. Band 12: Wassertechnik, Lufttechnik, Kälte-technik. München und Berlin, 1915.

**Properties of Steam and Ammonia**. By G. A. Goodenough. New York and London, 1915.

**Petroleum Technologist's Pocket Book**. By Sir Boerton Redwood and Arthur W. Eastlake. London, 1915.

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- CONNOR, EDWARD JAMES. 811 Union St., West Hoboken, N. J.
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- SCHEDLER, CARL WILLIAM, JR. Care, Great Western Electro-Chemical Co., Pittsburgh, Cal.
- SOUTHER, MORTON EDWIN. 554 Y. M. C. A., St. Paul, Minn.
- WALL, EDWARD WALTER. Gen. Supt., The Atlas Constr. Co., 37 Belmont St., Montreal, Que., Canada.

**RESIGNATIONS**

MEMBERS	Date of Resignation.
HAYNES, GEORGE ALBERT.....	Dec. 31, 1915

**DEATHS**

- BEACH, ROBERT JAMES. Elected Member, May 2d, 1900; died February 7th, 1916.
- CARR, WALTER FRANK. Elected Member, June 6th, 1894; died February 2d, 1916.
- JOHNSTON, JOHN HOWARD. Elected Member, March 1st, 1876; died in May, 1913.
- MCCRICKETT, THOMAS FRANCIS. Elected Member, January 2d, 1907; died January 26th, 1916.
- MILLARD, CURTISS. Elected Junior, April 3d, 1889; died February 16th, 1916.
- NICOLLS, WILLIAM JASPER. Elected Member, June 5th, 1878; died February 14th, 1916.
- SWINBURNE, GEORGE WAY. Elected Member, May 7th, 1902; died February 3d, 1916.
- TOWLE, STEVENSON. Elected Member, February 19th, 1868; died February 14th, 1916.
- WEBBER, CHARLES PERKINS. Elected Associate Member, October 7th, 1908; Member, January 7th, 1913; died January 30th, 1916.

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**Total Membership of the Society, March 2d, 1916,**

**7904.**

### MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(February 2d, to February 26th, 1916)

**NOTE.**—*This list is published for the purpose of placing before the members of this Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.*

#### LIST OF PUBLICATIONS

*In the subjoined list of articles, references are given by the number prefixed to each journal in this list:*

- (2) *Proceedings*, Engrs. Club of Phila., Philadelphia, Pa.
- (3) *Journal*, Franklin Inst., Philadelphia, Pa., 50c.
- (4) *Journal*, Western Soc. of Engrs., Chicago, Ill., 50c.
- (5) *Transactions*, Can. Soc. C. E., Montreal, Que., Canada.
- (6) *School of Mines Quarterly*, Columbia Univ., New York City, 50c.
- (7) *Gesundheits Ingenieur*, München, Germany.
- (8) *Stevens Institute Indicator*, Hoboken, N. J., 50c.
- (9) *Engineering Magazine*, New York City, 25c.
- (11) *Engineering* (London), W. H. Wiley, 432 Fourth Ave., New York City, 25c.
- (12) *The Engineer* (London), International News Co., New York City, 35c.
- (13) *Engineering News*, New York City, 15c.
- (14) *Engineering Record*, New York City, 10c.
- (15) *Railway Age Gazette*, New York City, 15c.
- (16) *Engineering and Mining Journal*, New York City, 15c.
- (17) *Electric Railway Journal*, New York City, 10c.
- (18) *Railway Review*, Chicago, Ill., 15c.
- (19) *Scientific American Supplement*, New York City, 10c.
- (20) *Iron Age*, New York City, 20c.
- (21) *Railway Engineer*, London, England, 1s. 2d.
- (22) *Iron and Coal Trades Review*, London, England, 6d.
- (23) *Railway Gazette*, London, England, 6d.
- (24) *American Gas Light Journal*, New York City, 10c.
- (25) *Railway Mechanical Engineer*, New York City, 20c.
- (26) *Electrical Review*, London, England, 4d.
- (27) *Electrical World*, New York City, 10c.
- (28) *Journal*, New England Water-Works Assoc., Boston, Mass., \$1.
- (29) *Journal*, Royal Society of Arts, London, England, 6d.
- (30) *Annales des Travaux Publics de Belgique*, Brussels, Belgium, 4 fr.
- (31) *Annales de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand*, Brussels, Belgium, 4 fr.
- (32) *Mémoires et Compte Rendu des Travaux*, Soc. Ing. Civ. de France, Paris, France.
- (33) *Le Génie Civil*, Paris, France, 1 fr.
- (34) *Portefeuille Économiques des Machines*, Paris, France.
- (35) *Nouvelles Annales de la Construction*, Paris, France.
- (36) *Cornell Civil Engineer*, Ithaca, N. Y.
- (37) *Revue de Mécanique*, Paris, France.
- (38) *Revue Générale des Chemins de Fer et des Tramways*, Paris, France.
- (39) *Technisches Gemeindeblatt*, Berlin, Germany, 0, 70m.
- (40) *Zentralblatt der Bauverwaltung*, Berlin, Germany, 60 pf.
- (41) *Electrotechnische Zeitschrift*, Berlin, Germany.
- (42) *Proceedings*, Am. Inst. Elec. Engrs., New York City, \$1.
- (43) *Annales des Ponts et Chaussées*, Paris, France.
- (44) *Journal*, Military Service Institution, Governors Island, New York Harbor, 50c.
- (45) *Coal Age*, New York City, 10c.
- (46) *Scientific American*, New York City, 15c.
- (47) *Mechanical Engineer*, Manchester, England, 3d.
- (48) *Zeitschrift*, Verein Deutscher Ingenieure, Berlin, Germany, 1, 60m.
- (49) *Zeitschrift für Bauwesen*, Berlin, Germany.
- (50) *Stahl und Eisen*, Düsseldorf, Germany.
- (51) *Deutsche Bauzeitung*, Berlin, Germany.
- (52) *Riga sche Industrie-Zeitung*, Riga, Russia, 25 kop.
- (53) *Zeitschrift*, Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria, 70h.
- (54) *Transactions*, Am. Soc. C. E., New York City, \$12.
- (55) *Transactions*, Am. Soc. M. E., New York City, \$10.
- (56) *Transactions*, Am. Inst. Min. Engrs., New York City, \$6.

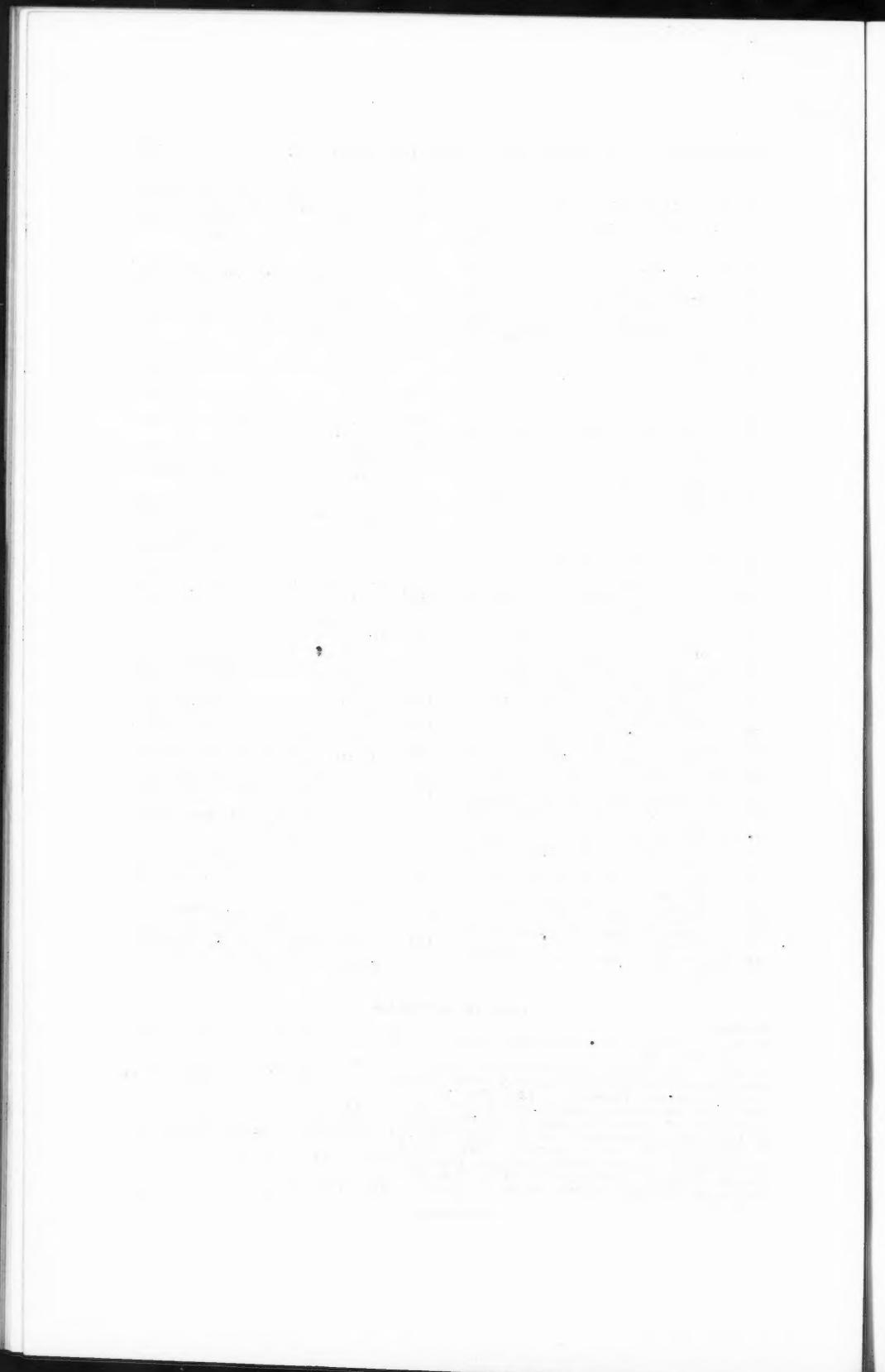
- (57) *Colliery Guardian*, London, England, 5d.  
 (58) *Proceedings*, Engrs' Soc. W. Pa., 2511 Oliver Bldg., Pittsburgh, Pa., 50c.  
 (59) *Proceedings*, American Water-Work Assoc., Troy, N. Y.  
 (60) *Municipal Engineering*, Indianapolis, Ind., 25c.  
 (61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.  
 (62) *Steel and Iron*, Thaw Bldg., Pittsburgh, Pa., 10c.  
 (63) *Minutes of Proceedings*, Inst. C. E., London, England.  
 (64) *Power*, New York City, 5c.  
 (65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.  
 (66) *Journal of Gas Lighting*, London, England, 6d.  
 (67) *Cement and Engineering News*, Chicago, Ill., 25c.  
 (68) *Mining Journal*, London, England, 6d.  
 (69) *Der Eisenbau*, Leipzig, Germany.  
 (71) *Journal*, Iron and Steel Inst., London, England.  
 (71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.  
 (72) *American Machinist*, New York City, 15c.  
 (73) *Electrician*, London, England, 18c.  
 (74) *Transactions*, Inst. of Min. and Metal., London, England.  
 (75) *Proceedings*, Inst. of Mech. Engrs., London, England.  
 (76) *Brick*, Chicago, Ill., 20c.  
 (77) *Journal*, Inst. Elec. Engrs., London, England, 5s.  
 (78) *Beton und Eisen*, Vienna, Austria, 1, 50m.  
 (79) *Forscherarbeiten*, Vienna, Austria.  
 (80) *Tonindustrie Zeitung*, Berlin, Germany.  
 (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.  
 (82) *Mining and Engineering World*, Chicago, Ill., 10c.  
 (83) *Gas Age*, New York City, 15c.  
 (84) *Le Cement*, Paris, France.  
 (85) *Proceedings*, Am. Ry. Eng. Assoc., Chicago, Ill.  
 (86) *Engineering-Contracting*, Chicago, Ill., 10c.
- (87) *Railway Engineering and Maintenance of Way*, Chicago, Ill., 10c.  
 (88) *Bulletin of the International Ry. Congress Assoc.*, Brussels, Belgium.  
 (89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa., \$5.  
 (90) *Transactions*, Inst. of Naval Archts., London, England.  
 (91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.  
 (92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.  
 (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.  
 (95) *International Marine Engineering*, New York City, 20c.  
 (96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.  
 (98) *Journal*, Engrs. Soc. Pa., Harrisburg, Pa., 30c.  
 (99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, \$2.  
 (100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., 50c.  
 (101) *Metal Worker*, New York City, 10c.  
 (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.  
 (103) *Mining Press*, San Francisco, Cal., 10c.  
 (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.  
 (105) *Metallurgical and Chemical Engineering*, New York City, 25c.  
 (106) *Transactions*, Inst. of Min. Engrs., London, England, 6s.  
 (107) *Schweizerische Bauzeitung*, Zürich, Switzerland.  
 (108) *Iron Tradesman*, Atlanta, Ga., 10c.  
 (109) *Journal*, Boston Soc. C. E., Boston, Mass., 50c.  
 (110) *Journal*, Am. Concrete Inst., Philadelphia, Pa., 50c.  
 (111) *Journal of Electricity, Power and Gas*, San Francisco, Cal., 25c.  
 (112) *Internationale Zeitschrift für Wasser-Versorgung*, Leipzig, Germany.  
 (113) *Proceedings*, Am. Wood Preservers' Assoc., Baltimore, Md.  
 (114) *Journal*, Institution of Municipal and County Engineers, London, England, 1s. 6d.

#### LIST OF ARTICLES

##### Bridges.

- On Impact Coefficients for Railway Girders.\* Charles William Anderson. (63)  
 Vol. 200, 1915.  
 Martins Creek Viaduct, Lackawanna & Western.\* (87) Feb.  
 Some Minor Problems in a Highway Bridge Design.\* L. M. Hastings. (109) Feb.  
 Concrete Railway Trestles.\* (13) Feb. 3.  
 Two Early Suspension Bridges Just Taken Down.\* (13) Feb. 3.  
 Load Tests of Foundation Soil in the Philippines. (13) Feb. 3.  
 Methods and Equipment Used in Constructing a Reinforced Concrete Viaduct at Danville, Ill.\* N. B. Garver. (86) Feb. 9.  
 Three-Hinged Concrete Bridge Falls by Undermining.\* (13) Feb. 10.  
 Bascule Bridge of Short Span.\* (13) Feb. 10.  
 Two Large Concrete Viaducts on the St. Paul.\* (15) Feb. 11.

\* Illustrated.

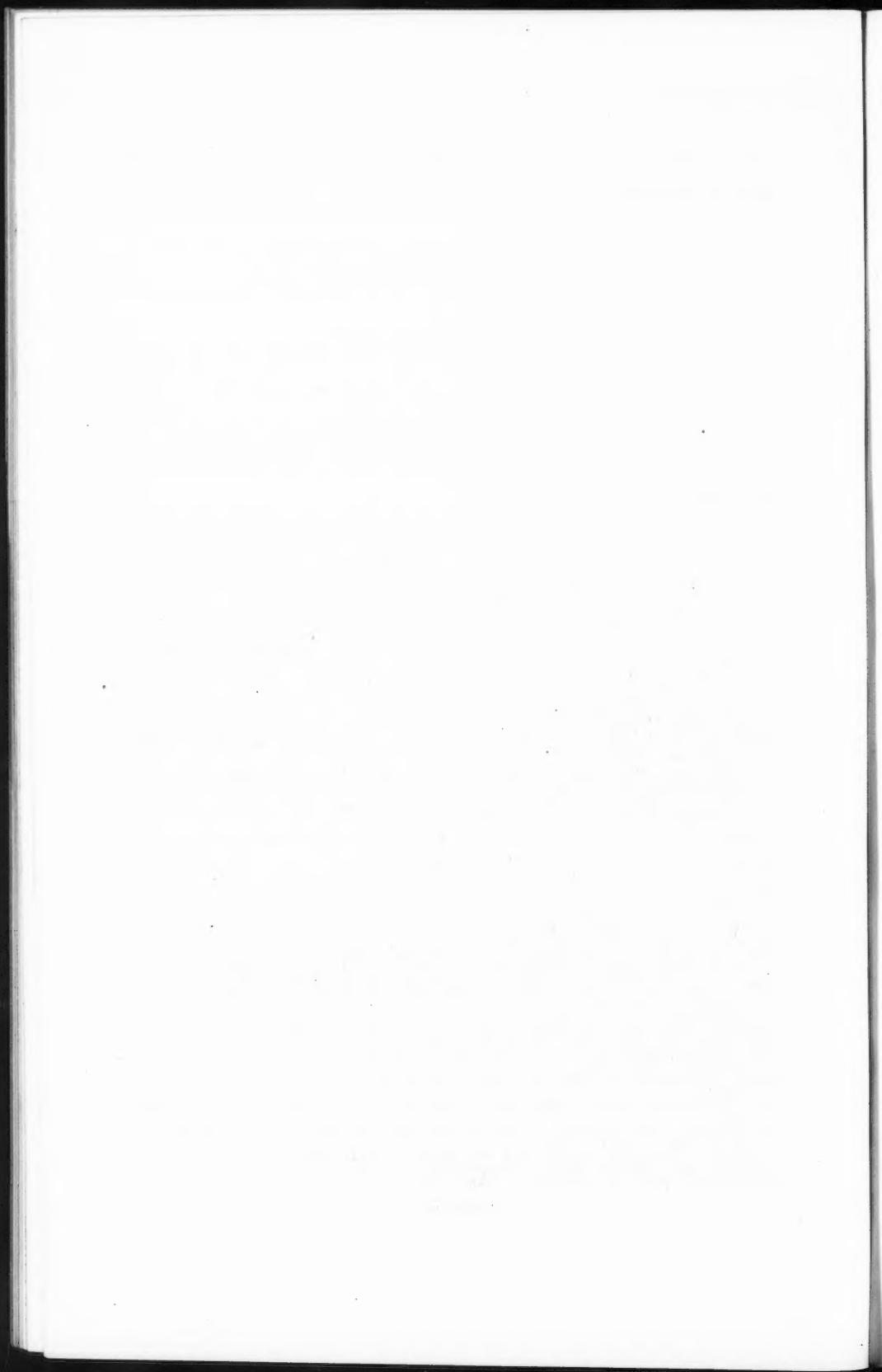


**Bridges—(Continued).**

- Highest Arch Highway Viaduct of Striking Appearance Economically Constructed.\* (14) Feb. 12.  
 Painting and Maintaining Steel Highway Bridges. George Hogarth. (96) Feb. 17.  
 The Reconstruction of the Ohio Connecting Bridge.\* (15) Feb. 18.  
 Raising a Three-Span Bridge Under Traffic.\* (15) Feb. 18.  
 Woodside-Winfield Cut-Off of the Long Island R. R.\* (18) Feb. 19.  
 Design and Construction of the Substructure for a Three-Track Trunnion Bascule Bridge in Chicago, Ill.\* (86) Feb. 23.  
 Concrete Highway Trestle.\* (13) Feb. 24.  
 City Bought Bridge Materials in Advance. (13) Feb. 24.  
 Patent for Arch Reinforcement Declared Valid.\* (14) Feb. 26.  
 Reinforced-Concrete Slab Tests Show Time Effects. A. T. Goldbeck and E. B. Smith. (14) Feb. 26.  
 Le Nouveau Viaduc en Béton sur le Big Creek à Cleveland (Ohio, É.-U.)\* (33) Jan. 15.  
 Les Ponts de Montauban.\* Charles Rabut. (33) Jan. 29.  
 Neues Verfahren zur raschen Ermittlung der Abmessungen und Eiseneinlagen von Gewölbefugen.\* R. Färber. (51) Serial beginning Sup. No. 11, 1915.  
 Eine Eisenbetonbogenbrücke in Kristianstad (Schweden).\* David Andersson. (78) Jan. 4.

**Electrical.**

- The Electrolytic Action of Return Currents in Electric Tramways on Gas- and Water-Mains; and the Best Means of Providing against Electrical Disturbances.\* Harry Edward Yerbury. (63) Vol. 200, 1915.  
 Central Station Steel Mill Electrification.\* Brent Wiley and Wilfred Sykes. (Paper read before the Assoc. of Iron and Steel Elec. Engrs.) (62) Oct. 1, 1915.  
 Purchased Power for Steel Mill Operation. C. S. Lankton. (Paper read before the Assoc. of Iron and Steel Elec. Engrs.) (62) Oct. 1, 1915.  
 Late Development in Electrical Equipment.\* K. A. Pauly. (Paper read before the Assoc. of Iron and Steel Elec. Engrs.) (62) Serial beginning Oct. 1, 1915.  
 Pressed Steel in Manufacture of Electric Motors.\* C. W. Starker. (72) Jan. 13.  
 The Double Dynamometer Wattmeter.\* C. V. Drysdale. (73) Serial beginning Jan. 14.  
 Modernization of Power Plant in Factories. W. A. Tookey. (Paper read before the Junior Institution of Engrs.) (47) Serial beginning Jan. 14.  
 Notes on the Ignition of Explosive Gas Mixtures by Electric Sparks.\* J. D. Morgan. (77) Jan. 15.  
 Conway Building Power Plant.\* Thomas Wilson. (64) Serial beginning Jan. 18.  
 Municipal Electricity Supply at Johannesburg. R. Turnbull Mawdesley. (26) Serial beginning Jan. 21.  
 A Comparison of 600, 1 200, and 2 400 Volt Switchboards.\* (12) Jan. 21.  
 On Microphones and Microphonic Contacts.\* P. O. Pedersen. (Abstract from *Elektroteknikeren*.) (73) Serial beginning Jan. 28.  
 The Goodman Storage Battery Locomotive, Particularly the Articulated Type.\* E. C. De Wolf. (82) Jan. 29.  
 Standby Battery for A. C. Distribution Service.\* J. Lester Woodbridge. (27) Jan. 29.  
 Electric Service in a Cotton-Duck Mill.\* (27) Jan. 29.  
 The Voltmeter Coil in Testing Transformers. A. B. Hendricks, Jr. (42) Feb.  
 The Municipally-Operated Electrical Utilities of Western Canada.\* A. G. Christie. (42) Feb.  
 A Method of Determining the Correctness of Polyphase Wattmeter Connections.\* W. B. Kouwenhoven. (42) Feb.  
 The Crest Voltmeter.\* L. W. Chubb. (42) Feb.  
 Crest Voltmeters.\* C. H. Sharp and E. D. Doyle. (42) Feb.  
 Chattering Wheel Slip in Electric Motive Power.\* G. M. Eaton. (42) Feb.  
 Notes on the Measurement of High Voltage.\* William R. Work. (42) Feb.  
 Arcs in Gases Between Non-Vaporizing Electrodes.\* G. M. J. Mackay and C. V. Ferguson. (3) Feb.  
 Municipal Power Plant at Medicine Hat.\* A. G. Christie. (64) Feb. 1.  
 Measuring Three-Phase Power by a Watt-Hour Meter.\* A. L. Temple. (64) Feb. 1.  
 The Predetermination of the Performance of Dynamo-Electric Machinery.\* Miles Walker. (77) Feb. 1.  
 Means for Producing a Sparkless Break of an Inductive Circuit.\* T. F. Wall. (73) Feb. 4.  
 The Alternating Current Single-Phase Induction Motor.\* A. E. Watson. (19) Feb. 5.  
 The Condenser Potentiometer in High Voltage Investigations.\* W. D. Peaslee and C. E. Oakes. (111) Feb. 5.  
 A Compact Alternating-Current City Substation.\* (27) Feb. 5.  
 Rochester State Hospital Plant.\* Thomas Wilson. (64) Feb. 8.  
 Cedar Rapids Power Development.\* (96) Feb. 10.



**Electrical—(Continued).**

- The Excitation of Synchronous Machines.\* Theo. Schon. (27) Serial beginning Feb. 12.
- Feeling Through the Fog by Wireless.\* Robert G. Skerrett. (46) Feb. 12.
- Meter-Test Current from Portable Batteries.\* (27) Feb. 12.
- Changes in Steam Station of Rhode Island Company.\* (27) Feb. 12.
- Data and Discussion on Efficiency in Public Utility Power Plants. Charles Grossman. (Paper read before the Indiana Eng. Soc.) (86) Feb. 16.
- The Million Volt Exposition Transformer.\* A. S. Lindstrom. (111) Feb. 19.
- Design of Million-Volt Experimental Transformer. Guy L. Bayley. (27) Feb. 19.
- Underground Distribution System at Calgary, Canada.\* J. N. Lightbody. (27) Feb. 19.
- Lighting a Church Auditorium Without Fixtures.\* A. L. Powell and R. B. Thompson. (27) Feb. 26.
- Electric Service in the Pearl of the Orient.\* (27) Feb. 26.
- Das Röntgenhaus des Allgemeinen Krankenhauses St. Georg in Hamburg.\* (40) Nov. 10, 1915.
- Die Leitungsüberführung über die Dievenow bei Hagen-Wullen.\* C. Bohnenberger. (41) Dec. 9, 1915.
- Die Kalkstickstoffwerke in Odda.\* Kurt Perlewitz. (41) Dec. 9, 1915.
- Der menschliche Körper als elektrisches Leitungsnets. G. Bucky. (41) Dec. 23, 1915.
- Ueber willkürliche Beeinflussung der Gestalt der Magnetisierungskurven, und über Material mit aussergewöhnlich geringer Hysterese.\* E. Gumlich und W. Steinhaus. (41) Serial beginning Dec. 23, 1915.
- Der Betrieb von Schwachstromanlagen in Anschluss an Starkstromnetze. Fritz Schröter. (41) Serial beginning Dec. 23, 1915.
- Die Bedeutung der symbolischen Bezeichnung und der Inversion für die Aufstellung des Transformatordiagramms.\* Ad. Thomälen. (41) Jan. 13.
- Die Wirtschaftlichkeit von Eisfabriken in Verbindung mit Elektrizitätswerken. Rich. Pabst. (41) Jan. 20.
- Fernsprechleitungen kleiner Verzerrung für mehrfache Verstärkung.\* H. Jordan. (41) Serial beginning Jan. 20.
- Ein neuer Frequenzmesser.\* W. Peukert. (41) Jan. 27.
- Das Kraftwerk an den Porjusfällen.\* (107) Serial beginning Jan. 29.

**Marine.**

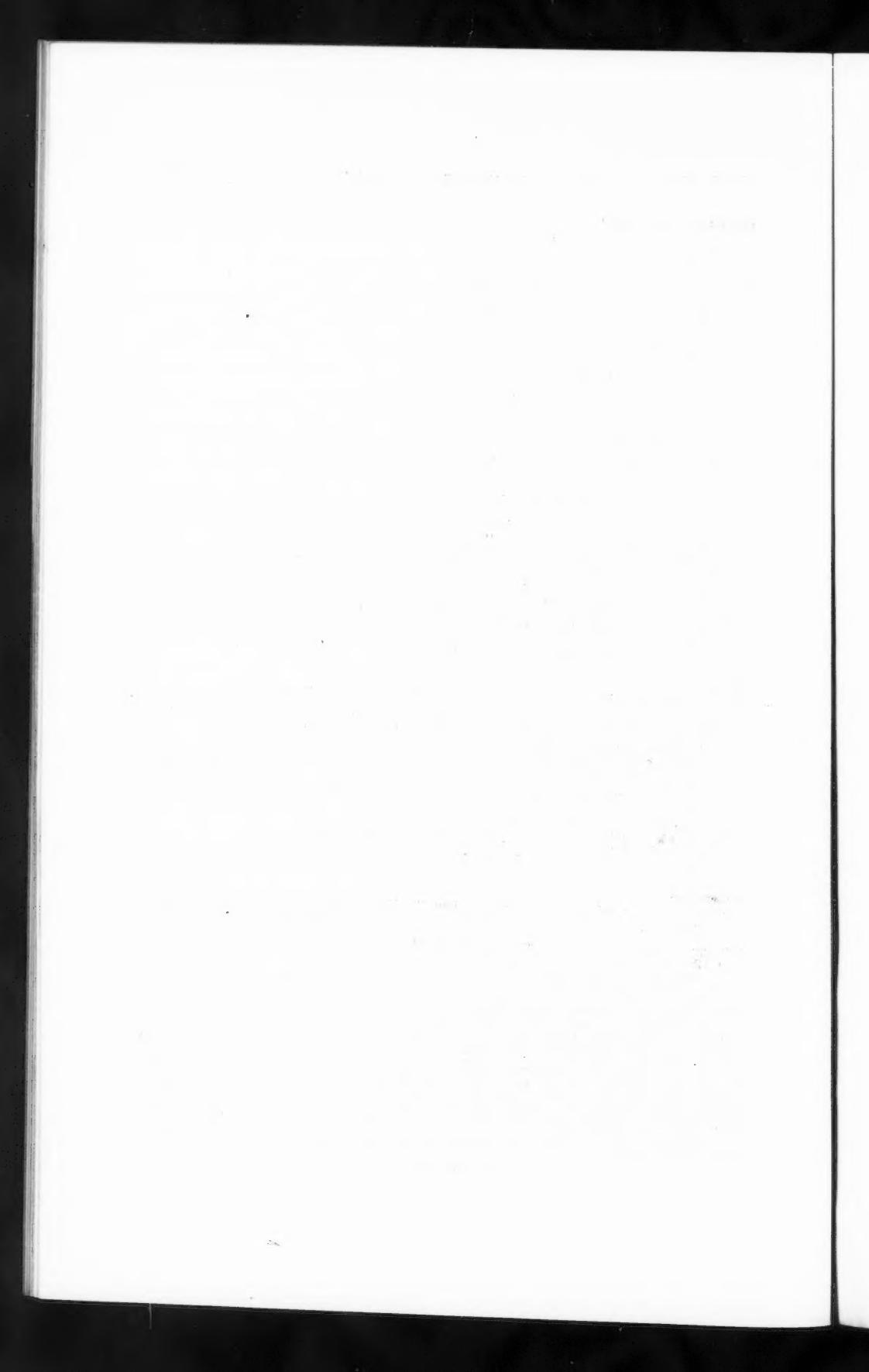
- The Mechanical Trimming of Coal in Ships' Bunkers.\* Cecil Walter Ward. (63) Vol. 200, 1915.
- The Electric Propulsion of Ships.\* J. Dorman. (Paper read before the Institution of Engrs. and Shipbuilders in Scotland.) (26) Jan. 14.
- Our Merchant Marine. (Report of the Boston Chamber of Commerce.) (19) Serial beginning Jan. 29.
- The U. S. Naval Engineering Experiment Station.\* Wm. L. De Baufre. (19) Jan. 29.
- The Imperative Need for Ships Owned by Americans. William C. Redfield. (9) Feb.
- Submarine Warfare.\* (46) Feb. 5.
- Naval Militia and Preparedness.\* W. J. Willis. (46) Feb. 5.
- La Stabilité des Sous-Marins.\* (33) Jan. 15.
- Les Tendances Actuelles dans la Construction des Sous-Marins.\* (33) Jan. 22.

**Mechanical.**

- The Effect of Chromium and Tungsten upon the Hardening and Tempering of High-Speed Tool Steel.\* Prof. C. A. Edwards, and H. Kikkawa. (71) Vol. 92, 1915.
- Sulphur in Malleable Cast Iron. R. H. Smith. (71) Vol. 92, 1915.
- The Chemistry of Furnace Efficiency and Air Supply. C. E. Lucke and E. D. Thurston, Jr. (6) July, 1915.
- Factors Governing Gas Producer Practice.\* Franz Denk. (62) Serial beginning Oct. 1, 1915.
- Sherardizing as a Manufacturing Problem. S. Trood. (Paper read before the Am. Foundrymen's Convention.) (62) Oct. 15, 1915.
- Casting and Machinery Under One Roof. Charles C. Lynde. (62) Oct. 15, 1915.
- Control of Ingot Piping and Segregation.\* Henry M. Howe. (Paper read before the Am. Iron and Steel Inst.) (62) Nov. 1, 1915.
- Developing Iron-bearing Materials Sinter.\* Bethune G. Klugh. (Paper read before the Am. Iron and Steel Inst.) (62) Serial beginning Nov. 1, 1915.
- Efficient Construction of Industrial Cars.\* Charles C. Lynde. (62) Nov. 15, 1915.
- Determination of Coke-Oven Heat Balance.\* (62) Dec. 1, 1915.
- Stack Gas for Boilers and Hot-blast Stoves. Ambrose N. Diehl. (62) Serial beginning Dec. 1, 1915.
- Power Requirements for Wire Drawing.\* Kenneth B. Lewis. (62) Dec. 1, 1915.

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\* Illustrated.



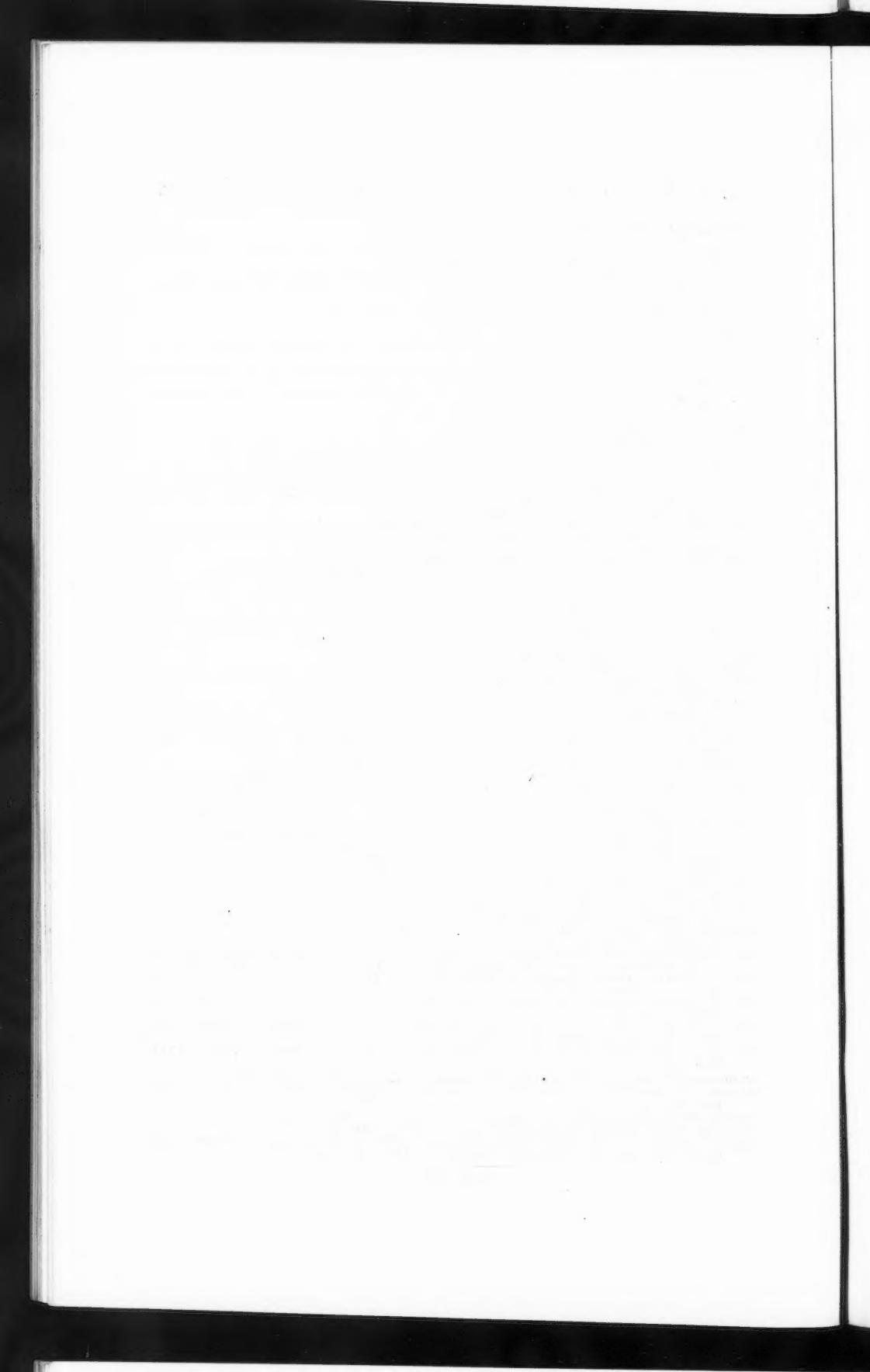
**Mechanical—(Continued).**

- Speeding Up Metal Stampings Production.\* Charles C. Lynde. (62) Dec. 15, 1915.
- Artificial Gas for High Temperature Work. E. Raven Rosen-Baum. (Paper read before the Industrial Fuel Sessions.) (62) Dec. 15, 1915.
- Boiler Explosion on the S. S. *Bernicia*.\* (From Report of the Board of Trade.) (47) Dec. 24, 1915.
- The Lubricants of Bearings and Cylinders.\* F. L. Fairbanks. (Paper read before the Worcester Polytechnic Inst.) (47) Dec. 31, 1915.
- Shortening Operation Time in Automobile Shops for Increased Production.\* Charles C. Lynde. (62) Jan.
- Manufacturing Factors in Refractory Brick.\* Robert H. H. Pierce. (Paper read before the Am. Chemical Soc.) (62) Serial beginning Jan.
- Flash and Fire Tests for Lubricating Oils. (From *Lubrication*.) (62) Jan.
- Slag Handling for Economical Utilization.\* Charles C. Lynde. (62) Jan. 1.
- Features of Rolling Mill Reversing Engines.\* W. Trinks. (62) Serial beginning Jan. 1.
- The Small-Shop Grinding Wheel.\* John H. Van Deventer. (72) Jan. 6.
- Electric Welding as Developed to Date.\* C. B. Auel. (Abstract of paper read before the Inter. Eng. Congress.) (47) Serial beginning Jan. 7.
- Industrial Gas: Its Services to the Nation.\* H. M. Thornton. (Paper read before the Derby Soc. of Engrs.) (66) Jan. 11.
- Swiss Tests of Gas-Fires.\* E. Ott. (66) Serial beginning Jan. 11.
- High-Pressure Distribution. T. F. Waugh. (Abstract from paper read before the New South Wales and Queensland Gas Inst.) (66) Jan. 11.
- Blastfurnace Boiler Plants.\* A. N. Diehl. (Paper read before the Am. Iron and Steel Inst.) (47) Jan. 14.
- Cooling System for Diesel-Engine Circulating Water.\* A. V. Youens. (64) Jan. 18.
- Noreturn Stop Valves.\* (64) Serial beginning Jan. 18.
- Boiler-Room Practice at Warrior Ridge. J. C. Scholl. (Abstract of paper read before the Pennsylvania Elec. Assoc.) (64) Jan. 18.
- Some Principles in Industrial Lighting. J. S. Dow. (Paper read before the Illuminating Eng. Soc.) (66) Jan. 18.
- Gas-Engines and Their Capacity for Dealing with Peak-Loads and Overloads. H. C. Widlake. (66) Jan. 18.
- Gaseous Combustion at High Pressure.\* William A. Bone. (From the *Philosophical Transactions of the Royal Society*.) (66) Jan. 18.
- Empirical Design of Gas-Engine Piston Pins.\* G. W. Lewis and A. G. Kessler. (72) Jan. 20.
- The Commercial Motor Vehicle for Railway and Industrial Purposes.\* (23) Jan. 21.
- The Electrification of Isolated Factories. (12) Serial beginning Jan. 21.
- The Hanyang Iron and Steel Works.\* (12) Serial beginning Jan. 21.
- Wire Rope: A Factor in Steel Making. James F. Howe. (Paper read before the Am. Assoc. of Iron and Steel Elec. Engrs.) (47) Serial beginning Jan. 21.
- Manufacture, Strength and Use of Chains, Slings, and Other Lifting Appliances.\* G. S. Taylor. (47) Serial beginning Jan. 21.
- Recent Improvements in Foundry Operations. Thomas D. West. (Abstract of paper read before the Inter. Eng. Congress.) (47) Serial beginning Jan. 21.
- Notes on Electric Welding Practice. (26) Serial beginning Jan. 21.
- Fuel Values.\* J. H. Paterson. (Paper read before the Soc. of Chemical Industry.) (57) Jan. 21.
- Economic Limit of Feed-Water Heating Surface.\* F. H. Rosencrantz. (64) Jan. 25.
- Power Plant of the Edmonton Portland Cement Co.\* A. G. Christie. (64) Jan. 25.
- Behavior of Boilers in Service.\* J. C. McCabe. (Paper read before the Detroit Eng. Soc.) (64) Jan. 25.
- The Utilization of Energy from Coal. William A. Bone. (Paper read before the Royal Institution.) (66) Serial beginning Jan. 25; (57) Feb. 4.
- Effect of Feed and Diameter on Cutting Speed of Drills.\* A. Lewis Jenkins. (72) Jan. 27.
- New Features in Forge Shop Design.\* (20) Jan. 27.
- One of the New British Projectile-Making Factories.\* (11) Jan. 28.
- A Suction Gas Producer Using Bituminous Coal.\* R. V. Farnham. (Paper read before the Institution of Engrs. and Shipbuilders in Scotland.) (57) Jan. 28.
- By-Products of Gas Manufacture.\* (From the *Chemist and Druggist*.) (19) Jan. 29.
- By-Product Coking Installation in Great Britain.\* Frederick C. Coleman. (45) Jan. 29.
- Zeppelin Airships. (From *Jahrbuch der Schiffbautechnische Gesellschaft*.) (19) Jan. 29.
- A Popular Explanation of a Rational Basis of Comparing Gas and Electric Lighting.\* G. C. Shadwell. (24) Jan. 31.
- Recovery of Ammonia from Waste Liquors.\* E. L. Knoedler. (From *Journal of Ind. and Eng. Chemistry*.) (24) Jan. 31.



**Mechanical—(Continued).**

- Exporting Coal Through Southern Ports. (Description of Coal Handling Apparatus at Charleston.)\* J. F. Springer. (108) Feb.
- The Selection of Machine Tools. George W. Armstrong. (25) Feb.
- Safety Code for the Use and Care of Abrasive Wheels. (Am. Soc. of Mech. Engrs.) (55) Feb.
- One of the World's Largest Crushing Plants.\* (67) Feb.
- New Universal Cement Plant.\* (67) Feb.
- Kehoe Iron Works.\* (108) Feb.
- Electric Operation and Automatic Electric Control for Machine Tools. L. C. Brooks. (55) Feb.
- Automatic Mechanical Control of Lathes and Screw Machines.\* L. D. Burlingame. (55) Feb.
- Pulverized Coal, Its Preparation and Use in Industrial Furnaces. S. H. Harrison. (9) Feb.
- Logical Factory Costs. W. E. McHenry. (9) Feb.
- Scale vs. Boiler Efficiency.\* (76) Feb. 1.
- The Cost of Burning Brick in Scove Kilns.\* Allen E. Beals. (76) Feb. 1.
- Making Silica Brick.\* Kenneth Seaver. (76) Serial beginning Feb. 1.
- Methods of Sulphate of Ammonia Manufacture at Bye-Product Coke-Ovens. T. H. Riley. (Paper read before the Coke-Oven Managers' Assoc.) (66) Feb. 1.
- The Utilization of Wood Waste. Arthur D. Little. (Paper read before the Am. Inst. of Chemical Engrs.) (105) Feb. 1.
- The Development in the United States of the Manufacture of Products Derived from Coal. H. W. Jordan. (Paper read before the Am. Inst. of Chemical Engrs.) (105) Feb. 1.
- Differential Gas Rates in Baltimore.\* Douglass Burnett. (83) Feb. 1.
- Mail Conveyor for Government Printed Matter.\* W. R. Metz. (64) Feb. 1.
- Details of First Government Built Diesel Engine.\* C. W. Nimitz. (Paper read before the Am. Soc. of Naval Engrs.) (64) Feb. 1.
- Ditching with Capstan Plows.\* (13) Feb. 3.
- Remington Arms Plant, with Probably the World's Largest Factory Building, Erected in Eight Months.\* (20) Feb. 3.
- Remodelling the Elswick Gasworks.\* (12) Feb. 4.
- The Autogenous Welding of Boiler-Plates. (11) Feb. 4.
- Turbo Blowers and Compressors.\* H. L. Guy and P. L. Jones. (Paper read before the South Wales Inst. of Engrs.) (57) Feb. 4; (22) Feb. 4.
- An Analysis of Oil Gas Tar. Herbert E. Brunkow. (111) Feb. 5.
- Diesel Engine Practice.\* J. E. Megson and H. S. Jones. (111) Serial beginning Feb. 5.
- Power-House Chimney Design for Bituminous Coal.\* Reginald Trautschold. (45) Feb. 5.
- Pennsylvania Begins Large Coal Pier at Baltimore. (14) Feb. 5.
- Comparative Efficiencies of Various Types of Air Compressors.\* (16) Feb. 5.
- The Gas Piping in the Bankers' Club, Equitable Building, New York. C. F. Herington. (24) Feb. 7.
- Naphthalene Motor Fuel. K. Bruhn. (Abstract from *Journal für Gasbeleuchtung*.) (24) Feb. 7.
- Acceptance Tests of B. & W. and Stirling Boilers.\* L. A. Quayle. (64) Feb. 8.
- Methods of Producing Sound Steel Ingots.\* Edward F. Kenney. (Abstract of paper read before the Am. Iron and Steel Inst.) (15) Feb. 11.
- Coal-Dust Firing in Reverberatory Furnaces. C. R. Kuzell. (Paper read before the Pan-Am. Scientific Congress.) (16) Feb. 12.
- Ore Unloading on the Great Lakes.\* J. H. Stratton. (Paper read before the Cleveland Eng. Soc.) (19) Feb. 12.
- English High Pressure Mains.\* B. F. Botwood. (Paper read before the Midland Junior Gas Assoc.) (24) Feb. 14.
- The Substitution of Heating Value for Candle Power as a Standard for Gas Quality. R. S. McBride. (Paper read before the Inter. Gas Congress.) (24) Feb. 14.
- Central Station Power Applied to Southern Clay Plants.\* (From the *Electrical Review*.) (76) Feb. 15.
- Refrigeration in France. L. Marchis. (Paper read before the Inter. Eng. Congress.) (105) Feb. 15.
- Effect of Diesel Engines on Fuel Supply and Cost. S. A. Hadley. (Paper read before the Kansas Eng. Soc.) (86) Feb. 16.
- Formulas and Alignment Charts for Taper Press Fits.\* A. Lewis Jenkins. (72) Feb. 17.
- Cableway of Asbestos Corporation of Canada.\* S. R. Stone. (82) Feb. 19.
- Manufacture and Uses of Alloy Steels. Henry D. Hibbard. (18) Serial beginning Feb. 19.
- Fusible Plugs Investigated by Bureau of Standards. (13) Feb. 24.
- The New Steel Works at Lowellville, Ohio.\* (20) Feb. 24.
- Recent Progress in Electrical Smoke Precipitation.\* F. G. Cottrell. (Paper read before the Pan-Am. Scientific Congress.) (16) Feb. 26.



**Mechanical—(Continued).**

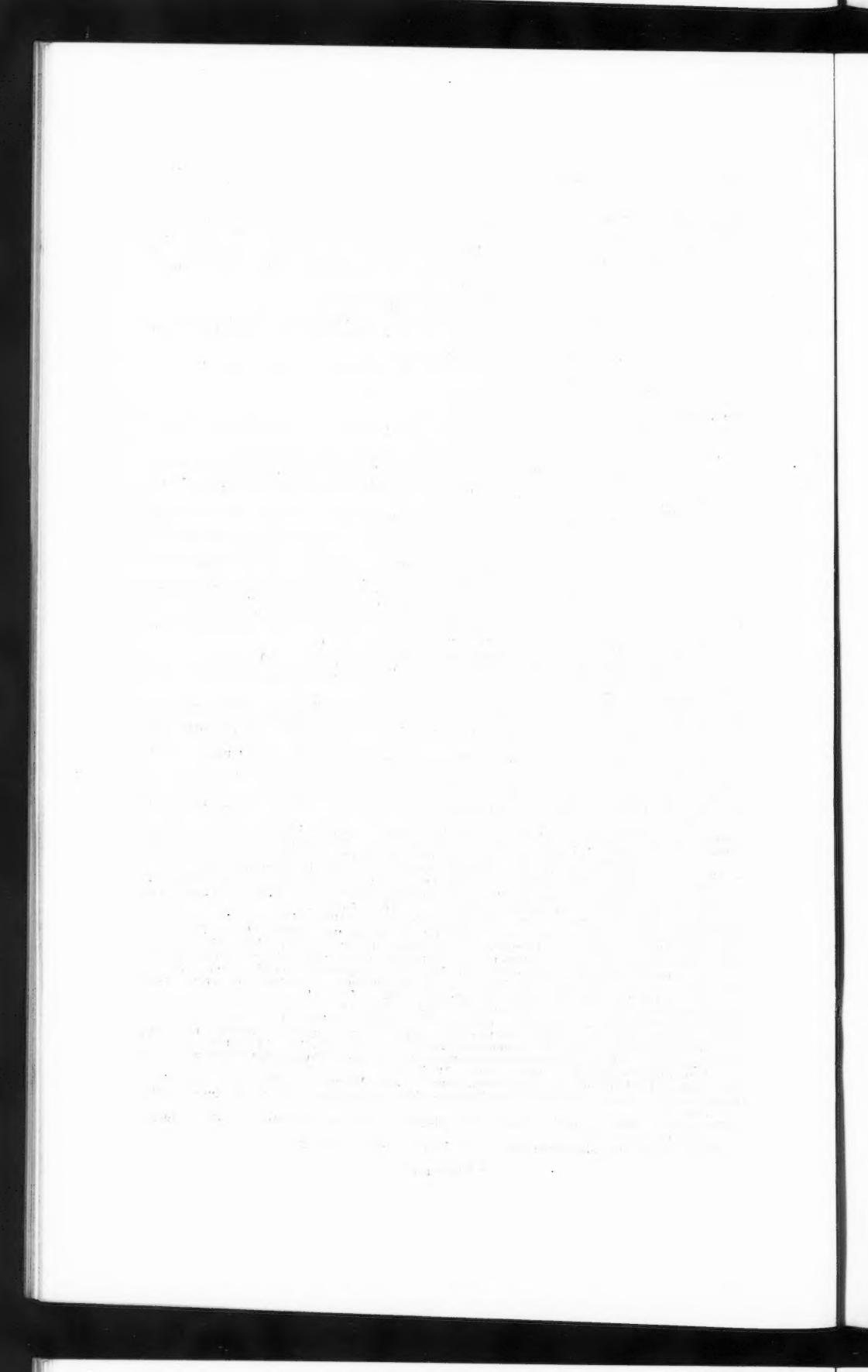
- L'Extraction du Benzol du Gaz d'Eclairage et son Emploi dans la Fabrication des Explosifs.\* Daniel Florentin. (33) Jan. 15.  
 Le Nouvel Hydro-Aéroplane Triplan Système Curtiss.\* Ch. Dantin. (33) Jan. 22.  
 Das Auswuchten umlaufender Maschinenteile.\* E. Heidebroek. (48) Serial beginning Jan. 1.  
 Motorflüge.\* Gustav Fischer. (48) Serial beginning Jan. 1.  
 Papierstoffgarne und gewebe.\* W. Heinke. (48) Jan. 8.  
 Ueber die Wärmeübertragung von strömendem überhitztem Wasserdampf an Rohrwandungen und von Heizgasen an Wasserdampf.\* R. Poensgen. (48) Serial beginning Jan. 8.  
 Koks für Gaserzeuger. H. Markgraf. (50) Jan. 20.  
 Berechnung der Scheiben- und Hohlkolben.\* M. Herrmann. (53) Jan. 21.  
 Ueber Selbstgreifer.\* (53) Jan. 21.

**Metallurgical.**

- Note on the Carburization of Iron at Low Temperatures in Blast-Furnace Gases.\* T. H. Byrom. (71) Vol. 92, 1915.  
 Phosphorus in Iron and Steel.\* W. H. Hatfield. (71) Vol. 92, 1915.  
 The Influence of Heat Treatment on the Specific Resistance and Chemical Constitution of Carbon Steels.\* Edward D. Campbell. (71) Vol. 92, 1915.  
 The Influence of Oxygen on Some Properties of Pure Iron.\* Wesley Austin. (71) Vol. 92, 1915.  
 The Occurrence and Influence of Nitrogen on Iron and Steel.\* Prof. N. Tschischewski. (71) Vol. 92, 1915.  
 Recent Blast Furnace Advancement. A. E. MacCoun. (Paper read before the Am. Iron and Steel Inst.) (62) Oct. 1, 1915.  
 Checkerwork for Open Hearth Furnace Use. W. A. Janssen. (Paper read before the Am. Foundrymen's Assoc.) (62) Nov. 1, 1915.  
 Stack Gas for Boilers and Hot-blast Stoves. Ambrose N. Diehl. (Paper read before the Am. Iron and Steel Inst.) (62) Serial beginning Nov. 1, 1915.  
 Melting Alloys in an Electric Furnace Unit. R. S. Wile. (62) Dec. 1, 1915.  
 Data on Costs of Electric Steel. F. T. Snyder. (Paper read before the Am. Electrochemical Soc.) (47) Dec. 24, 1915.  
 A Practical Discussion of Heat Treatment.\* W. H. Phillips. (62) Jan.  
 Uses of Extra Coke on the Blast Furnace. Wallace G. Imhoff. (62) Jan. 1.  
 The Electrical Resistance of Some Heat-Treated Copper-Zinc-Nickel Alloys.\* F. C. Thompson. (77) Serial beginning Jan. 15.  
 Blast Furnace Smelting of Cyanide Precipitate. Regis Chauvenet. (105) Jan. 15.  
 Modern Methods of Burning Blast-Furnace Gas in Stoves and Boilers.\* A. N. Diehl. (Paper read before the Am. Iron and Steel Inst.) (22) Serial beginning Jan. 21.  
 Coal and Coke Efficiency in Blast Furnace Operation. Birger F. Burman. (105) Serial beginning Feb. 1.  
 Oils and Other Reagents in Flotation. Robert J. Anderson. (105) Feb. 1.  
 Colloids and Colloidal Slimes. E. E. Free. (16) Feb. 5.  
 The Washoe Reduction Works, Anaconda.\* L. S. Austin. (103) Serial beginning Feb. 5.  
 Stamps and Competitive Machinery. H. C. Cutler. (103) Feb. 5.  
 Metallurgy of Native-Silver Ores of Southwestern Chihuahua.\* W. M. Brodie. (Paper read before the Pan-Am. Scientific Congress.) (16) Feb. 12.  
 Metallurgical Operations at the Braden Copper Co. R. E. Douglass and B. T. Colley. (Paper read before the Pan-Am. Scientific Congress.) (16) Feb. 12.  
 Metallurgical Operations at the Chile Exploration Co.\* C. A. Rose. (Paper read before the Pan-Am. Scientific Congress.) (16) Feb. 12.  
 Molecular Forces in Flotation.\* Dudley H. Norris. (103) Feb. 12.  
 The Calcination of Zinc Carbonate.\* William P. Simpson. (105) Feb. 15.  
 The Operation of the Blast Furnace. J. E. Johnson, Jr. (105) Feb. 15.  
 The Hydrometallurgical Treatment of Complex Gold and Silver Ores. G. H. Cleverger. (Paper read before the Pan-Am. Congress.) (105) Feb. 15.  
 The Conservation of Lead and Zinc. C. E. Siebenthal. (Abstract of paper read before the Pan-Am. Scientific Congress.) (82) Feb. 19.  
 Flotation Principles. C. Terry Durell. (103) Feb. 19.  
 Refining Cupriferous Precipitate. Jackson A. Pearce. (103) Feb. 19.  
 High Sulphur does not Injure Openhearth Steel. J. S. Unger. (Abstract of paper read before the Soc. of Automobile Engrs.) (13) Feb. 24; (72) Feb. 3.  
 Maschinenhaus für die Hochofenblasemaschine VI der Rheinischen Stahlwerke in Duisburg-Meiderich.\* (69) Nov., 1915.  
 Die praktische Prüfung des Stahlwerksteers.\* Jos. Wagner. (50) Dec. 23, 1915.  
 Eine bemerkenswerte Neuerung im Betriebe des Martinofens.\* Karl Kniepert. (50) Jan. 18.  
 Gefügelehre, Eisen- und Metall-Legierungen.\* Georg Lindner. (48) Serial beginning Jan. 15.  
 Verbund-Hochofenblasemaschine.\* F. Peter. (48) Jan. 22.

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\* Illustrated.



**Metallurgical—(Continued).**

- Beitrag zur Gattierungsfrage in der Giesserei.\* Richard Fichtner. (50) Serial beginning Jan. 27.  
 Ueber den Einfluss eines Spänebrikettzusatzes auf den Verlauf des Kupolofenprozesses und auf die Beschaffenheit des erschmolzenen Eisens. (50) Serial beginning Jan. 27.  
 Zugfestigkeit und Kohäsion bei Metallen und Legierungen. R. Vondrácek. (53) Jan. 28.

**Military.**

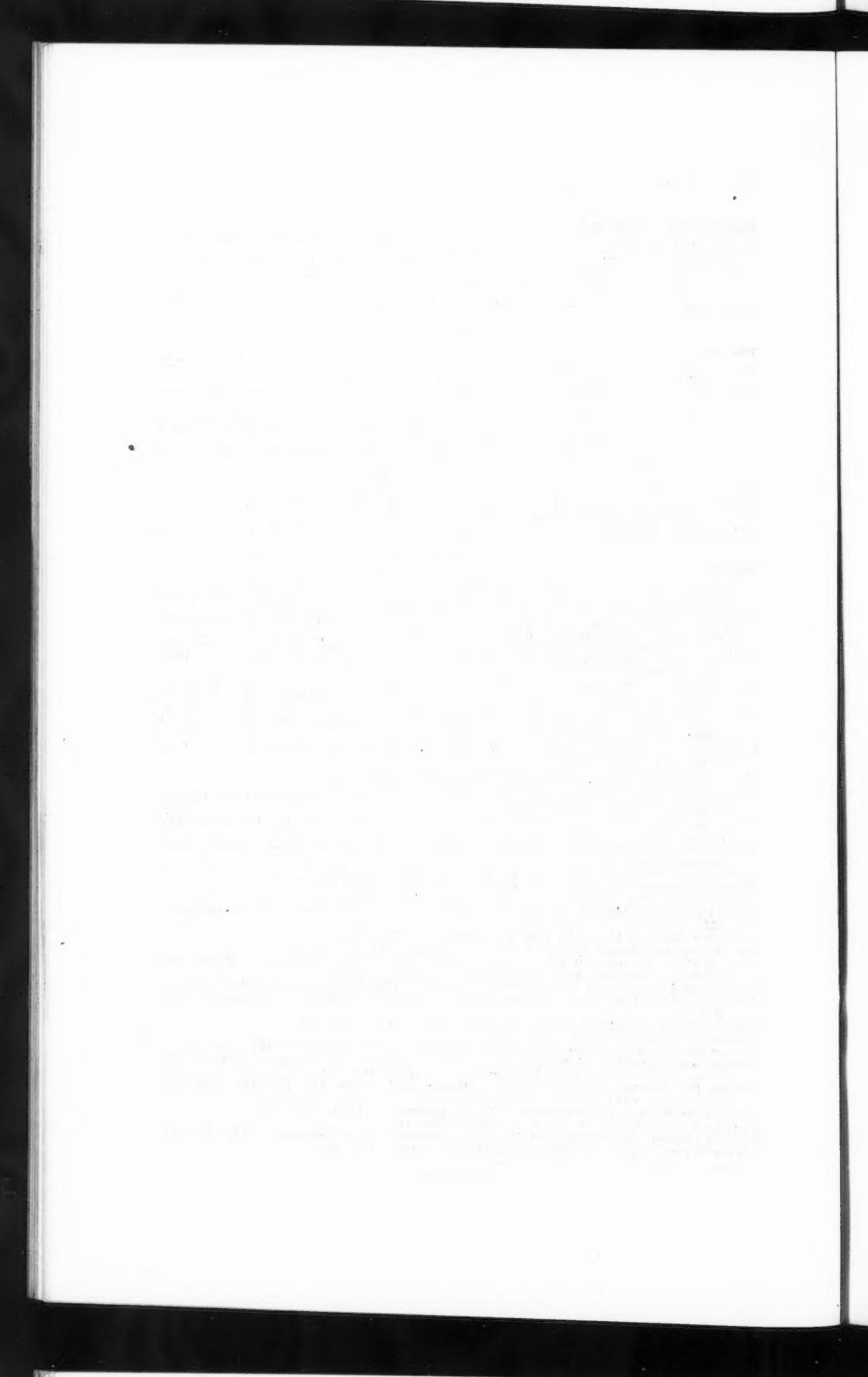
- Manufacturing British 18-Pounder High-Explosive Shells.\* E. A. Suverkrop. (72) Serial beginning Jan. 6.  
 Three-Inch Russian Shrapnel.\* John H. Van Deventer. (72) Serial beginning Jan. 20.  
 German Shells and the Influence of Certain Elements on the Physical Properties of Steel. J. E. Stead. (Paper read before the Cleveland Inst. of Engrs.) (47) Jan. 28, 1915; (12) Jan. 14; (22) Jan. 14.  
 Industrial Lessons from the German War Machine. C. E. Knoepfel. (9) Serial beginning Feb.  
 Keeping an Army Supplied.\* Alfred Gradenwitz. (46) Feb. 5.  
 Production of 8-In. and 9.2-In. Shells. C. A. Tupper. (20) Feb. 17.  
 Railway Military Preparedness. Chauncey B. Baker. (Abstract of paper read before the Massachusetts Street Ry. Assoc.) (17) Feb. 19.  
 Making Five Million Primers for Cartridge Cases.\* Fred H. Colvin. (72) Feb. 24.

**Mining.**

- The Basement Rocks of the Bunter, with Special Reference to the Inundation at the Coppice Colliery. G. M. Cockin. (Paper read before the South Staffordshire and Warwickshire Inst. of Min. Engrs.) (106) Vol. 50, Pt. 2.  
 Forming a Shaft-Pillar in Thin Seams.\* James Black. (Paper read before the Min. Inst. of Scotland.) (106) Vol. 50, Pt. 2.  
 Studies of the Geology of the Kent Coalfield.\* E. A. Newell Arber. (Paper read before the South Staffordshire and Warwickshire Inst. of Min. Engrs.) (106) Vol. 50, Pt. 2.  
 The Geological Structure of the South Lancashire Coalfield.\* George Hickling. (Paper read before the Manchester Geol. and Min. Soc.) (106) Vol. 50, Pt. 2.  
 Modern American Coal-Mining Methods, with Some Comparisons.\* Samuel Dean. (Paper read before the North of England Inst. of Min. and Mech. Engrs.) (106) Vol. 50, Pt. 2.  
 Valuation of Anthracite Mines. R. V. Norris. (Paper read before the Inter. Eng. Congress.) (6) July, 1915.  
 The Use of Explosives. Harrison Souder. (98) Jan.  
 A New Firedamp Detector.\* George A. Burrell. (57) Jan. 14.  
 The Pressure of Gas in Coal Beds. N. H. Darton. (From *Bulletin* 72, U. S. Bureau of Mines.) (57) Serial beginning Jan. 21.  
 Notes on Mine Ventilation.\* John Shanks. (From *Bulletin* of the Canadian Min. Inst.) (57) Jan. 21.  
 Equipment of Miners' Wash and Change Houses.\* Joseph H. White. (101) Serial beginning Jan. 28.  
 Simplicity in Tipple Design.\* R. G. Miller. (45) Jan. 29.  
 The Present Value of a Mine. F. Sommer Schmidt. (103) Feb.  
 A Puzzle in Mining Costs.\* J. F. K. Brown. (45) Feb. 5.  
 Motor-Driven Pumping Installation at Leonard Mine, Butte, Mont.\* R. H. Richards. (27) Feb. 5.  
 Sinking a Shaft in Rock 180 Feet per Month.\* (13) Feb. 10.  
 The Design for Shaker Screens.\* C. C. Wright. (45) Feb. 12.  
 Mine of Chile Exploration Co., Chuquicamata, Chile. Pope Yeatman. (Paper read before the Pan-Am. Scientific Congress.) (16) Feb. 12.  
 Underground Compressor Installations in Mines.\* Charles C. Phelps. (82) Feb. 12.  
 Antimony Mining in Cœur d'Alene District, Idaho.\* Robert L. Brainard. (82) Feb. 12.  
 New Operation in an Old Field.\* C. M. Young. (45) Feb. 19.  
 Permissible Coal Cutters.\* (45) Feb. 19.  
 Mining the Mammoth Vein with Steam Shovels.\* D. C. Helms. (45) Feb. 19.  
 Storage and Handling of Explosives in Mines. Charles E. Munroe. (Paper read before the Pan-Am. Scientific Congress.) (16) Feb. 19.  
 Mining in Ecuador. J. W. Mercer. (Paper read before the Pan-Am. Scientific Congress.) (16) Feb. 19; (103) Feb. 29.  
 Quicksilver Mining in California.\* W. H. Landers. (103) Feb. 19.  
 Stoping Methods.\* F. W. Sperr. (103) Feb. 19.  
 Drilling Methods in Driving 6-Ft. Tunnel in Granite.\* S. W. Symons. (13) Feb. 24.  
 Shaker Screen Drive.\* William H. McGann. (14) Feb. 26.

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\* Illustrated.



**Miscellaneous.**

- The Engineer as a Witness. John M. Patterson. (2) Oct., 1915.  
 Engineering Societies and Publicity. C. E. Drayer. (2) Oct., 1915.  
 The Development and Importance of an Adequate Engineering Department for a  
 Public Service Commission. Walter A. Shaw. (4) Nov., 1915.  
 Light and Illumination. Charles P. Steinmetz. (4) Nov., 1915.  
 The Production of Ammonia from Cyanamid. W. S. Landis. (Paper read before  
 the Am. Inst. of Chemical Engrs.) (105) Jan. 15.  
 The Grading Industries.\* Edward S. Wiard. (105) Serial beginning Jan. 15.  
 On the Single-Line Spectra of Magnesium and Other Metals and Their Ionizing  
 Potentials. J. C. McLennan. (3) Feb.  
 The Physical Photometer in Theory and Practice. W. W. Coblenz. (3) Feb.  
 Pan-American Use of the Metric System. Frederick Brooks. (109) Feb.  
 Modern Illumination.\* E. Stroud. (Paper read before the London and Southern  
 Dist. Junior Gas Assoc.) (66) Feb. 1.  
 Some Practical Pointers on Buying for a City. Fowler S. Smith. (Paper read  
 before the City Managers' Assoc.) (86) Feb. 2.  
 Concentration of Control of Public Utilities.\* (27) Feb. 5.  
 What Constitutes Utility Value? Philip J. Kealy. (Abstract of paper read before  
 the Am. Elec. Ry. Assoc.) (17) Feb. 5.  
 The Elements of Utility Valuation. George Weston. (Abstract of paper read before  
 the Am. Elec. Ry. Assoc.) (17) Feb. 5.  
 Uncertainty of Utility Valuation. T. S. Williams. (Abstract of paper read before  
 the Am. Elec. Ry. Assoc.) (17) Feb. 5.  
 The Fixation of Atmospheric Nitrogen.\* Robert G. Skerrett. (20) Feb. 10.  
 An Anemometric Paradox, A Wind Motor That is Not Affected by the Direction of  
 the Wind.\* R. Villers. (From *La Nature*.) (19) Feb. 12.  
 A Differentiator.\* Armin Elmendorf. (19) Feb. 12.  
 Liquid Chlorine. G. Ornstein. (Paper read before the Am. Electrochemical Soc.)  
 (105) Feb. 15.  
 Photochemistry. Harry A. Curtis. (Paper read before the Teknik Club of Denver.)  
 (105) Feb. 15.

**Municipal.**

- Town Planning Schemes and Open Spaces. Lawrence W. Chubb. (Paper read before  
 the Town Planning Inst.) (104) Jan. 21.  
 Sand and Oil Roads and Surfaces. W. R. Farrington, M. Am. Soc. C. E. (109)  
 Feb.  
 Construction of Concrete Roads in Milwaukee.\* H. J. Kuelling. (67) Feb.  
 Causes of Failure in Creosoted Wood-Block Pavement.\* (13) Feb. 3.  
 Oiling of Earth Roads. B. H. Piepmeyer. (Abstract from *Bulletin No. 11*, Illinois  
 State Highway Dept.) (96) Feb. 3.  
 Sand and Oil Road Construction Methods Improved by Massachusetts Commission.  
 (14) Feb. 5.  
 Methods and Costs of Construction of Concrete Pavements at Tonawanda, N. Y.  
 A. F. Comstock. (Paper read before the Illinois Soc. of Engrs. and Surveyors.)  
 (86) Feb. 9; (14) Feb. 5.  
 Reclaiming Stone from Old Macadam for Concrete Base.\* Stanley E. Bates. (86)  
 Feb. 9.  
 General Principles of Road Improvement. W. Muir Edwards. (96) Feb. 10.  
 Bituminous-Carpeted Concrete Road of New Type.\* (13) Feb. 10.  
 Essential Physical Properties of Sand, Gravel, Slag and Broken Stone for Use in  
 Bituminous Pavements. Francis P. Smith. (Paper read before the Highway  
 Eng. Course at Columbia Univ.) (96) Feb. 10.  
 Smooth Concrete Roads Produced by Accurate Headers.\* (14) Feb. 12.  
 Concrete Road-Building Methods Yield Profits in Cash Instead of in Plant.\* H. E.  
 Breed. (14) Feb. 12.  
 Methods of Remedyng Slipperiness on Surface Treated Macadam Roads. Burr  
 Powell Harrison. (Abstract from paper read before the Maryland Agricultural  
 College.) (86) Feb. 16.  
 Methods of Applying Bituminous Mastic Fillers for Block Pavements.\* John S.  
 Crandall. (Abstract of paper read before the Indiana Eng. Soc.) (86) Feb. 16.  
 Road Construction as Governed by Traffic Requirements. Robert C. Muir. (96)  
 Feb. 17.  
 Present Scope for Practical Work in Improving Canadian Cities. Thomas Adams.  
 (Paper read before the Civic Improvement League.) (96) Feb. 17.  
 Newark Commission Urges Importance of City Plan. (14) Feb. 19.  
 Standard Warning Signs on Portland, Ore., Streets.\* (86) Feb. 23.  
 Limitations of Results of Tests of Bituminous Materials.\* Chas. N. Forrest.  
 (Abstract from paper read at Columbia Univ.) (96) Feb. 24.  
 Tar-Coated Concrete Pavement in Ann Arbor, Mich. Manley Osgood. (13) Feb. 24.  
 Construction Methods Tested in Du Pont Concrete Road. Charles Upham. (14)  
 Feb. 26.

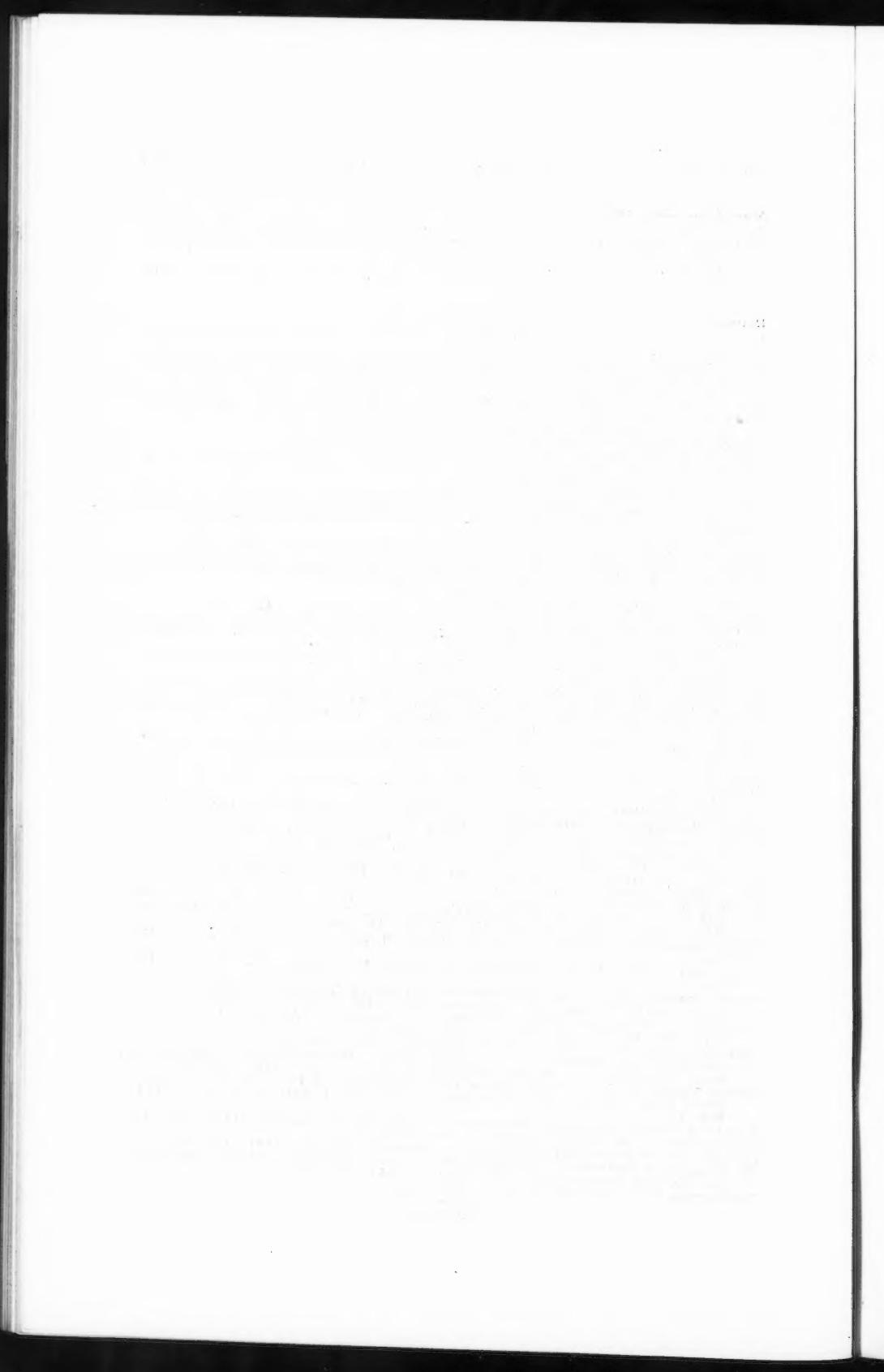


**Municipal—(Continued).**

Concrete Road Conference Adopts Code of Recommended Practice. (14) Feb. 26.  
 Nation-Wide Canvass by Experts Sifts Out Best Methods of Concrete Road Building.  
 (Abstract of Report to the National Conference on Concrete Road Building.)  
 (14) Feb. 26; (86) Feb. 23.  
 Zum Bebauungsplan-Wettbewerb Zurichs und seiner Vororte.\* Carl Jegher. (107)  
 Jan. 22.

**Railroads.**

- Ventilation of Tunnels and Subways in America.\* Charles Samuel Churchill.  
 (63) Vol. 200, 1915.  
 The Equipment of Intermediate Sidings and Single-Line Crossing-Loops, New South  
 Wales Government Railways.\* Alexander Sinclair Macdonald Caldwell Smith.  
 (63) Vol. 200, 1915.  
 The Relations of the Railways and the Public. L. E. Johnson. (4) Nov., 1915.  
 Electrification of the Manchester to Bury Section of the Lancashire and Yorkshire  
 Railway.\* (11) Jan. 14; (12) Jan. 14; (73) Jan. 14.  
 New Tank Locomotive, North British Railway.\* (23) Jan. 21.  
 Southern Railway Dynamometer Car.\* (25) Feb.  
 Construction of Roadbed and Track. E. A. Hadley. (Paper read before the St.  
 Louis Ry. Club.) (87) Feb.  
 Efficiency and Standardization in Track Maintenance Work. S. L. Conner. (Paper  
 read before the New England R. R. Club.) (87) Feb.  
 Railways of the Republic of Colombia, South America.\* Jose M. Rosales. (87)  
 Feb.  
 Locomotive Water and Coal Consumption.\* Harold A. Huston. (25) Feb.  
 Automatic Train Control.\* (21) Feb.  
 Principles of Railway Block and Interlocking Signals.\* Harold McCready. (Paper  
 read before the Richmond R. R. Club.) (87) Feb.  
 Report of I. C. C. Division of Safety. (25) Feb.  
 Operation on the Norfolk & Western Railway.\* F. E. Wynne. (42) Feb.  
 The Liquid Rheostat in Locomotive Service.\* A. J. Hall. (42) Feb.  
 Recent Developments in Brake Engineering Principles and Practice.\* S. W. Dudley.  
 (65) Feb.  
 Operation of Parallel and Radial Axles of a Locomotive by a Single Set of Cylinders.\*  
 Anatole Mallet. (55) Feb.  
 Gilded Stairs and Marble Halls.\* Reginald Gordon. (9) Feb.  
 A 12-Mile Railway Built by Hand in Five Months. (13) Feb. 3.  
 Drainage of Railway Roadbeds.\* M. C. Blanchard. (Abstract of paper read before  
 the Kansas Eng. Soc.) (13) Feb. 3.  
 Turnouts for Narrow-Gage Industrial Railway Track.\* Ralph D. Brown. (13)  
 Feb. 3.  
 Track Bolts of Alloy Steel. (13) Feb. 3.  
 Eastern and Central Time Standards in Ohio and Michigan.\* Myron E. Wells.  
 (15) Feb. 4.  
 The Canadian Northern Extension to Vancouver.\* V. J. Boland. (15) Feb. 4.  
 Cost of Maintaining Private Sidings. (15) Feb. 4.  
 Construction Work on the Paducah & Illinois Railroad.\* (15) Feb. 4.  
 The Government and American Railroad Needs. Otto H. Kahn. (From *World's  
 Work*.) (15) Feb. 4.  
 Canadian Northern Steel Frame Passenger Cars.\* (15) Feb. 4; (25) Feb.  
 The Baghdad Railway.\* (12) Feb. 4.  
 Government Regulation and Our Transportation Systems. Oscar W. Underwood.  
 (Abstract of a paper read before the Am. Elec. Ry. Assoc. and Am. Elec. Ry.  
 Mrs.' Assoc.) (18) Feb. 5; (17) Feb. 5; (15) Jan. 11.  
 Mallet Compound Locomotives for the South African Railways. F. C. Coleman. (18)  
 Feb. 5.  
 Some Facts About Federal Valuation of Railroads. Thomas W. Hulme. (18)  
 Feb. 5.  
 Power Requirements in the Electrification of Chicago Railroads.\* (Abstract from  
 Report of the Chicago Assoc. of Commerce.) (18) Feb. 5.  
 Principles of Railway Valuation. Nathaniel T. Guernsey. (Abstract of paper read  
 before the Am. Elec. Ry. Assoc.) (17) Feb. 5.  
 Notes on Tunnel Survey Work. M. H. Marshall. (96) Feb. 10.  
 The Malady of the Railways of the United States. Howard Elliott. (Abstract of  
 paper read before the Chamber of Commerce of the U. S.) (15) Feb. 11.  
 Lehigh Valley to Try Out 136-Pound Rail; Experimental Rail for Which only a  
 Small Order has been Placed, is Heavier than any T-Rail yet in Use.\* (14)  
 Feb. 12.  
 Repairing Electric Locomotive Resistance Grids.\* Thomas B. Ray. (17) Feb. 12.  
 Construction of the Hudson Bay Ry.\* (18) Feb. 12.  
 Collision Due to False Signal Indication at Rockledge, Tenn.\* (18) Feb. 12.  
 The Relation of Railroads to Foreign Trade. Fairfax Harrison. (Paper read before  
 the National Foreign Trade Convention.) (15) Feb. 18.  
 Refrigerator Cars for the Santa Fe.\* (15) Feb. 18.



**Railroads—(Continued).**

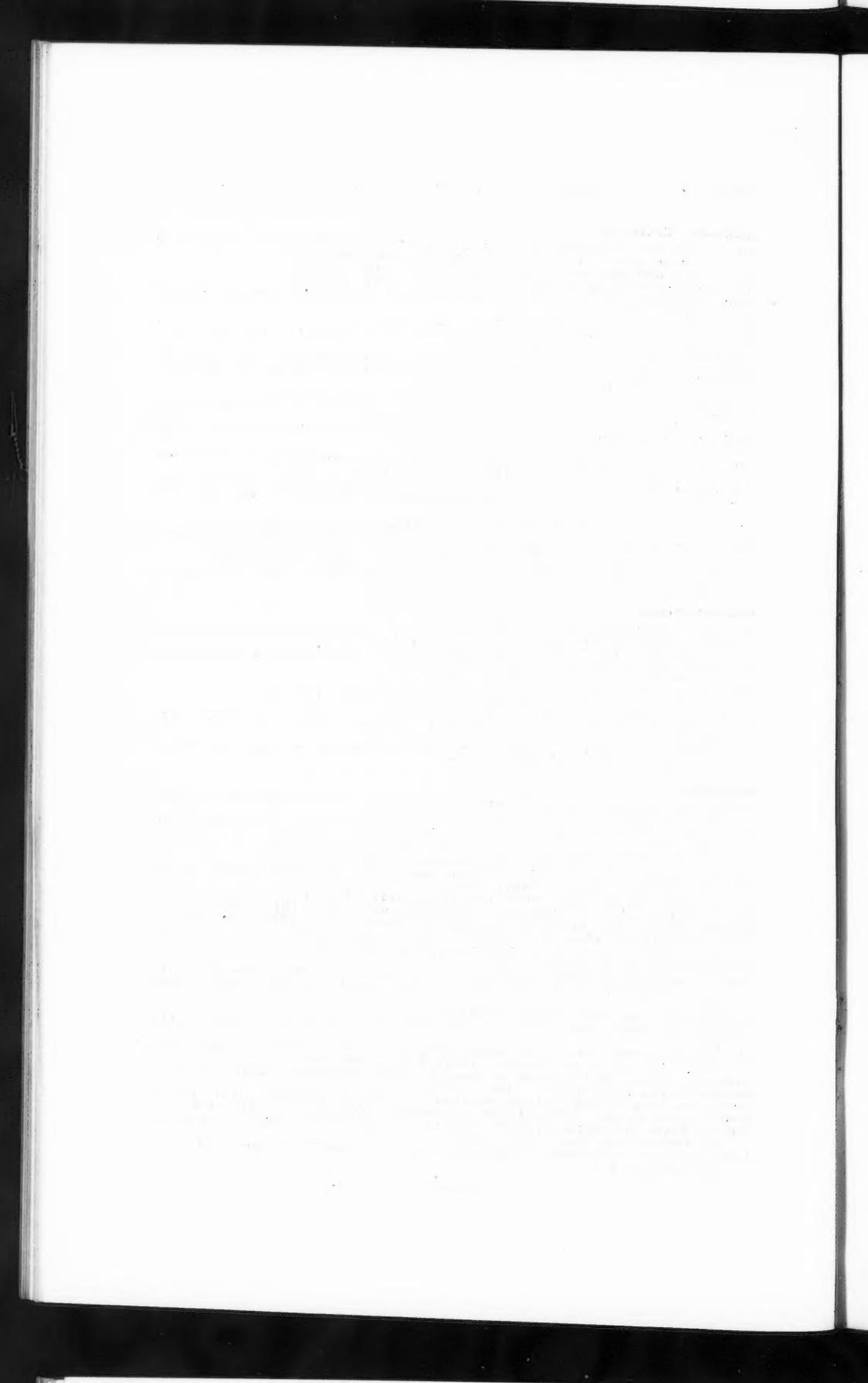
- Various Methods of Draining Railway Roadbeds.\* M. O. Blanchard. (Paper read before the Kansas Eng. Soc.) (15) Feb. 18; (86) Feb. 16.
- The Largest Railroad Track Scale in the World.\* (15) Feb. 18.
- Principles Governing the Allotment of New Rail. (15) Feb. 18.
- Plan for Lehigh Valley Station at Buffalo Places Train Shed Columns Between Tracks.\* (14) Feb. 19.
- The Fungus of Decay in Railroad Ties.\* (18) Feb. 19.
- Rogers Pass Tunnel Method Chosen for Economy. J. G. Sullivan. (13) Feb. 24.
- Track-Scale Specifications. (13) Feb. 24.
- Brazilian Opportunities and the Brazil Railway.\* F. E. Lawrence. (13) Feb. 24.
- Baltimore & Ohio Chicago Terminal: A Modern Terminal Layout for Passenger Equipment.\* (15) Feb. 25.
- Operation of Norfolk & Western's Electrified Line.\* (15) Feb. 25.
- Reducing Cost of Handling L. C. L. Freight.\* W. H. Gatchell, W. F. Hebard, M. R. Sutherland and J. W. Lawhead. (15) Feb. 25.
- Wall-Plate Drift Method Used for the Most Part in Twin Peaks Tunnel, San Francisco.\* (14) Feb. 26.
- Die elektrische Beleuchtung der Haupt-, Vor- und Weichen-Signale in Hauptbahnhofe Nürnberg.\* Naderer. (102) Nov. 15, 1915.
- Ventilregler für Lokomotiven, Bauart Schmidt und Wagner.\* (102) Nov. 15, 1915.
- Der Bogenwiderstand steifachsigter Eisenbahnwagen.\* Boedecker. (40) Nov. 24, 1915.
- Die Berechnung der Fahrzeiten.\* A. Zissel. (102) Dec. 15, 1915.
- Das Verhalten der Querschwellen unter der Last in der Bettung und ihre Formgebung.\* A. Przygode. (102) Dec. 15, 1915.
- Die Reibung zwischen Rad und Schiene.\* Boedecker. (40) Dec. 25, 1915.
- Die Drahtseilbahn Erdmannsdorf-Augustusburg.\* D. E. Bahse. (51) Serial beginning Jan. 15.

**Railroads, Street.**

- Bay State Carhouse at Lowell.\* (17) Jan. 29.
- Carhouse Design and Construction. C. F. Bedwell. (Abstract of paper read before the Am. Elec. Ry. Assoc.) (17) Jan. 29.
- Increasing Capacity of Urban Systems. M. C. Brush. (Abstract of paper read before the Am. Elec. Ry. Assoc.) (17) Feb. 5.
- Main Street Subway, Moncton, N. B.\* (96) Feb. 10.
- Reducing Accidents on the Union Traction System.\* (17) Feb. 12.
- Cleveland Modernizes Fifty Cars.\* (17) Feb. 19.
- Electric Railway Track Construction in Paved Streets.\* Thomas W. Blinn.. (17) Feb. 19.
- Traffic Studies in Lafayette, Ind.\* D. D. Ewing. (Abstract of paper read before the Indiana Eng. Soc.) (17) Feb. 19.

**Sanitation.**

- Engineering Operations for the Prevention of Malaria.\* Frank Dudley Evans. (63) Vol. 200, 1915.
- Electric Heating: Its Present Position and Future Development.\* George Wilkinson. (77) Jan. 15.
- Atmospheric, Vacuo-Vapor and Vacuum Heating Systems.\* James D. Hoffman. (Paper read before the Inter. Eng. Congress.) (64) Jan. 18.
- Activated Sludge.\* C. H. Cooper. (Paper read before the Lower Thames Valley Dist. Surveyors' Assoc.) (104) Jan. 21.
- New Comfort Stations Under Public Library.\* (101) Jan. 21.
- Reinforced Concrete Sewer Aqueduct Over Australian River.\* (104) Jan. 28.
- Heating Horticultural Palace at Exposition.\* Connecticut. (101) Jan. 28.
- Heat Distribution in Warm-Air Furnace.\* John R. Allen. (Paper read before the Am. Soc. of Heating and Ventilating Engrs.) (101) Jan. 28.
- Sewage Disposal from Railway Depots.\* (21) Feb.
- Methods and Costs of Dredge Excavation of Drainage Ditches. D. L. Yarnell. (Abstract from *Bulletin No. 300*, Office of Public Roads and Rural Eng.) (86) Feb. 2.
- Building Relief and Outlet Sewers at Chicago.\* (13) Feb. 3.
- Cleaning up After Snowstorms in Philadelphia.\* William H. Connell. (13) Feb. 3.
- The Activated-Sludge Process of Sewage Purification. G. J. Fowler. (Paper read before the Inst. of San. Engrs.) (104) Feb. 4; (96) Feb. 10.
- Hydrolytic Sewage Settling Tanks at Luton.\* J. W. Tomlinson. (104) Feb. 4.
- Electric Heating in the West.\* (101) Feb. 4.
- Sewage Gas Tank Utilized for Light and Heat.\* Charles C. Hommon. (14) Feb. 5.
- House Heating by Gas. (From Report of Committee, N. C. G. A.) (24) Feb. 7.
- Concrete Sewer Construction in South Bend, Ind. W. E. Graves. (Paper read before the Indiana Eng. Soc.) (86) Feb. 9.
- Activated-Sludge Experiments at Milwaukee, Wis. T. Chalkley Hatton. (13) Serial beginning Feb. 10.

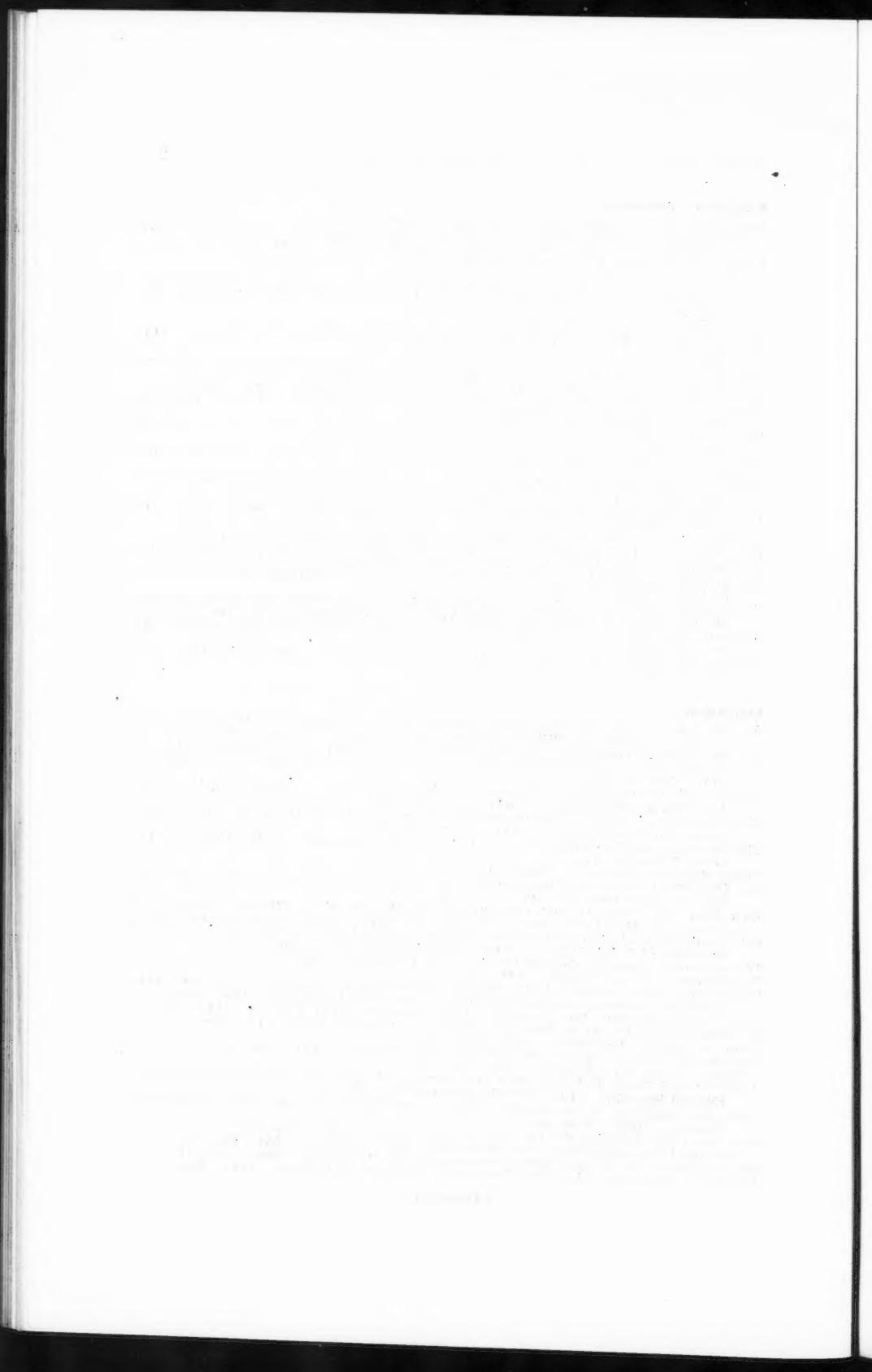


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- Ventilating Modern Ohio Factory Building.\* (101) Feb. 11.  
 Remodel Septic Tank into Two-Story Tank. N. N. Campbell. (Abstract of paper read before the Illinois Soc. of Engrs. and Surveyors.) (14) Feb. 12.  
 Largest Imhoff Tank Plant nearly Ready to Treat Rochester's Sewage.\* C. Arthur Poole. (14) Feb. 12.  
 Some Hints on the Design and Operation of Intermittent Sand Sewage Filters.\* D. C. Faber. (Abstract from *Bulletin No. 16* of the Iowa State College.) (86) Feb. 16.  
 Storm Sewers in Moose Jaw, Sask.\* Geo. D. Mackie. (96) Feb. 17.  
 Wheeled Mixing Plant and Travelers Build Sewer Rapidly.\* E. Novak. (14) Feb. 19.  
 Air Diffusers Tested at Milwaukee Sewage Plant. T. Chalkley Hatton. (Abstract of paper read before the Ill. Soc. Engrs. and Surveyors.) (14) Feb. 19.  
 Gas Fired, Hot Air, Circulating Heaters.\* H. Thurston Owens. (24) Feb. 21.  
 Methods, Cost and Results Obtained in the Use of Asphalt for Joints in Tile Pipe Sewers.\* Paul E. Green. (86) Feb. 23.  
 Why House Connections to the Sewer Should be Carefully Made. C. G. Wigley. (36) Feb. 24.  
 Draining the Roseau River Swamp in Minnesota.\* George H. Herrold. (13) Feb. 24.  
 Dispositif Permettant aux Mutilés des Membres Inférieurs de Conduire une Voiture Automobile.\* Leon Masson. (92) Nov., 1915.  
 Ueber die Filterwirkung von Böden auf kolloidhaltige Wässer. Karl Sack. (7) Serial beginning Nov. 13, 1915.  
 Die hygienische Bedeutung guter Brunnen. Hugo Kühl. (39) Dec. 20, 1915.  
 Ein Beitrag zur Untersuchung der Sinkstoffbewegung in städtischen Entwässerungs-kanälen.\* Curt Weidlich. (39) Serial beginning Dec. 20, 1915.  
 Bau-und Betriebstechnisches für zentralheizungen in preussischen Staatsgebäuden. R. Über. (40) Dec. 22, 1915.  
 Ueber den Einfluss heisser Abwässer auf die Dichtungen von Steinzeugrohren und über die Eigenschaften geeigneten Muffenkittes. Viktor Schmah. (7) Dec. 25, 1915.  
 Badewannengeruchverschlüsse und Badezimmersinkkästen.\* Otto Splegelberg. (7) Dec. 25, 1915.  
 Beitrag zur Theorie des "gleichwertigen Querschnittes."\*\* Alfred Fröhlich. (7) Dec. 25, 1915.

**Structural.**

- A Method of Determining the Initial Tensions in Rope Stays Supporting Towers or Similar Structures.\* William Edward Corrie. (63) Vol. 200, 1915.  
 On the Magnetic Transformation of Cementite: with a Note on the Magnetic Aspects of the A-3 Transformation in Pure Iron.\* Kōtarō Honda and Hiromu Takagi. (71) Vol. 92, 1915.  
 Commercial Development of Alloy Steels. Edgar D. Rogers. (Paper read before the Am. Iron and Steel Inst.) (62) Nov. 15, 1915.  
 The Corrosion of Metals: Ferrous and Non-Ferrous. Robert Hadfield. (Paper read before the Faraday Soc.) (47) Dec. 31, 1915.  
 The Bending and Torsion of Beams of Commercial Section.\* E. G. Ritchie. (11) Serial beginning Jan. 21.  
 Public Slaughter-houses.\* (104) Jan. 28.  
 An Alloy Steel of Special Composition. J. B. Rhodes. (From *Journal of the Am. Soc. of Naval Engrs.*) (47) Jan. 28.  
 Cast Iron: The Strength and Properties of Castings.\* E. L. Rhead. (Paper read before the Manchester Assoc. of Engrs.) (47) Serial beginning Jan. 28.  
 Oil-Mixed Portland Cement Concrete. Logan Waller Page. (From *Bulletin 230* of the Office of Public Roads.) (19) Serial beginning Jan. 29.  
 Waterproofing Concrete Roof of Pier.\* J. B. Gardiner. (87) Feb.  
 Foundations. Chas. T. Main. (55) Feb.  
 Theoretical Determination of the Bending Moment and Deflection in Columns Subjected to Combined Bending and Compression. David Kaplan. (86) Feb. 2.  
 Bone's Retaining-Wall Patent and its Anticipations.\* (13) Feb. 10; (14) Feb. 19.  
 A Fallacy in the Design of Retaining Walls.\* Gilbert D. Fish. (13) Feb. 10.  
 Trap vs. Slag for Aggregate. (13) Feb. 10.  
 Trolley-Car Concrete Mixer for Street-Railway Track.\* (13) Feb. 10.  
 "Dapple" Finish for Concrete. (13) Feb. 10.  
 Analysis and Tests Held to Show Advantages of New Flat-Slab Reinforcement.\* Edward Smulski. (14) Serial beginning Feb. 12.  
 Lutes and Cements. S. S. Sadtler. (Paper read before the Am. Inst. of Chemical Engrs.) (105) Feb. 15.  
 New Gas Office Building for the City of New York.\* (83) Feb. 15.  
 A Converted Carpenter Who Now Builds with Burned Clay.\* (76) Feb. 15.  
 Practical Selection of Aggregates for Concrete. R. J. Borhek. (86) Feb. 16.  
 Stresses in Rivets used in Direct Tension.\* Jacob M. Friedland. (13) Feb. 17.



**Structural—(Continued).**

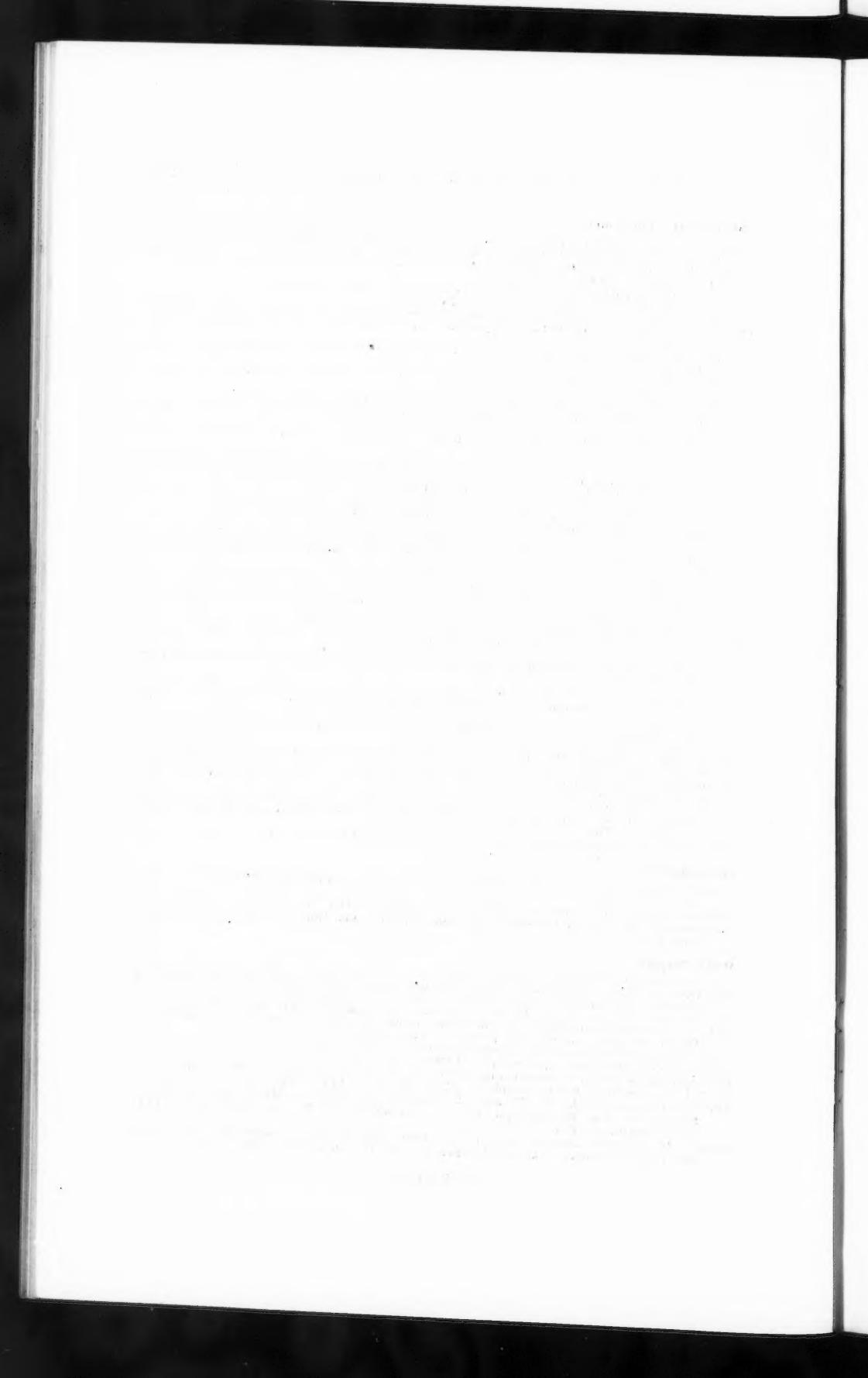
- Eight Tests on Built-Up Timber Columns.\* H. D. Dewell. (13) Feb. 17.
- Standardized Industrial Buildings.\* W. J. Austin. (20) Feb. 17.
- Philadelphia Electric Company Power Station A-2 has Four 12-Foot Steel Stacks 165 Feet High.\* (14) Feb. 19.
- Heavily Loaded with Snow Cathedral Dome Falls.\* (14) Feb. 19.
- Safety Scaffolds for Buildings.\* (13) Feb. 24.
- Placing Warm-Air Registers in a Concrete Floor.\* Arthur C. Hewitt. (13) Feb 24.
- Steam-Hammer Pile Formulas, Suggestions and Queries. A. M. Knowles. (13) Feb. 24.
- Yellow-Pine Timber Graded Without Guesswork. Hermann von Schrenk. (13) Feb. 24.
- Bending Moment in Continuous Reinforced-Concrete Beams.\* Raymond J. Roark. (13) Feb. 24.
- Concrete Pipe Tunnel, N. T. R., Quebec.\* C. V. Johnson. (96) Feb. 24.
- Stresses in Lattice Bars of Channel Columns.\* William Worth Pearse. (96) Feb. 24.
- Diverse Methods Feature New York Subway Concreting.\* Robert Ridgway (14) Feb. 26.
- Building Districts and Restrictions to be Based upon Definite Principles; New York City Commission Working on Plans for Regulating Height of Buildings, Area of Courts and Location of Trades. (14) Feb. 26.
- Improvised Blow Torch Heats Concrete Inside the Mixer. (14) Feb. 26.
- Cresoting Plant at Orrville, Ohio, has Vertical Cylinders for Wood Blocks.\* E. A. Sterling. (14) Feb. 26.
- Heavy Concrete Footings Suspended in Underpinning Columns.\* (14) Feb. 26.
- Le Tunnel Astoria à New-York pour le Passage de Conduites de Gaz sous l'East River.\* F. Hofer. (33) Feb. 5.
- Der Bismarckthurm bei Leipzig.\* Em. Haimovici. (51) Sup. No. 11, 1915.
- Ueber den Wärmeschutz von Hohlziegeln. R. Poensgen. (7) Nov. 6, 1915.
- Eisenbetonarbeiten vom Bau der Hafenmühle, T. Biernert, Dresden-Friedrichstadt.\* H. Marcus. (51) Serial beginning Sup. No. 1.
- Erleichterung für Schüttbeton-Gründungen.\* R. Scheek. (51) Sup. No. 1.
- Die Kämpferdruck-Schnittlinie im 2-Gelenkrahmen.\* R. Knabel. (51) Serial beginning Sup. No. 1.
- Die Bestimmung des Mischungsverhältnisses von erhärtetem Mörtel und Beton.\* (51) Sup. 2.
- Plattenversuche des Deutschen Ausschusses für Eisenbeton.\* Hager. (78) Jan. 4.
- Hafet der Baunaehler für Schaden durch Materialfehler? Eckstein. (78) Jan. 4.
- Besondere Bedingungen für die Vergebung von Eisenbetonarbeiten. W. Schnidtmann. (78) Jan. 4.
- Die Eisenbeton-Hallenbinder der neuen Markthalle am Dorotheenplatz in Stuttgart.\* H. Nitzsche. (78) Jan. 4.
- Ausführungen von Gründungen mit Pressbetonpfählen.\* August Wolfsholz. (78) Serial beginning Jan. 4.
- Mitteilungen aus dem Technischen Laboratorium der Tiefbauverwaltung der Stadt Charlottenburg, Dichtungs-und Schutzmittel für Zementmörtel und Beton.\* Paul Hermann. (78) Jan. 4.
- Amerikanische Betonversuche.\* M. R. v. Thullie. (53) Jan. 28.

**Topographical.**

- A Rapid Method of Contouring Plans in the Field.\* Howard Kennedy Lamb. (63) Vol. 200, 1915.
- Replaces Stakes by Monument without a Transit.\* (14) Feb. 12.
- Comparateurs de 4 et de 24 Mètres du Gouvernement des Indes. (33) Serial beginning Feb. 5.

**Water Supply.**

- The Taxalxalpan Aqueduct Tunnels, Mexico.\* James Forgie. (63) Vol. 200, 1915.
- The Flow of Water over Sharp-Edged Notches and Weirs.\* Harold John Frederick Gourley and Bernard Santo Crimp. (63) Vol. 200, 1915.
- Ancient and Modern Water Works.\* Edward Wegmann. (2) Oct., 1915.
- A Short Description of Some of the Construction Features of the Greater Winnipeg Water Supply.\* James H. Fuertes. (4) Nov., 1915.
- Lake Margaret Hydro-electric Power Scheme.\* (12) Jan. 14.
- Bristol's Ferro-Concrete Reservoir.\* (104) Jan. 21.
- Redwood Stave Pipe for Mining and Power Use.\* H. B. Worden. (82) Jan. 29.
- P. P. I. E. Auxiliary Water Supply.\* E. C. Eaton. (111) Jan. 29.
- The Construction of the 25, 13 and 12 Diameter Steel Water Mains and the Water Supply of New Westminster (B. C.), Canada.\* J. W. B. Blackman. (114) Serial beginning Feb.
- Repairs to Defective Masonry on the Up-stream Side of the La Boquilla Dam, Below the Water-Surface.\* Edwin Duryea and G. G. Underhill. (36) Feb.

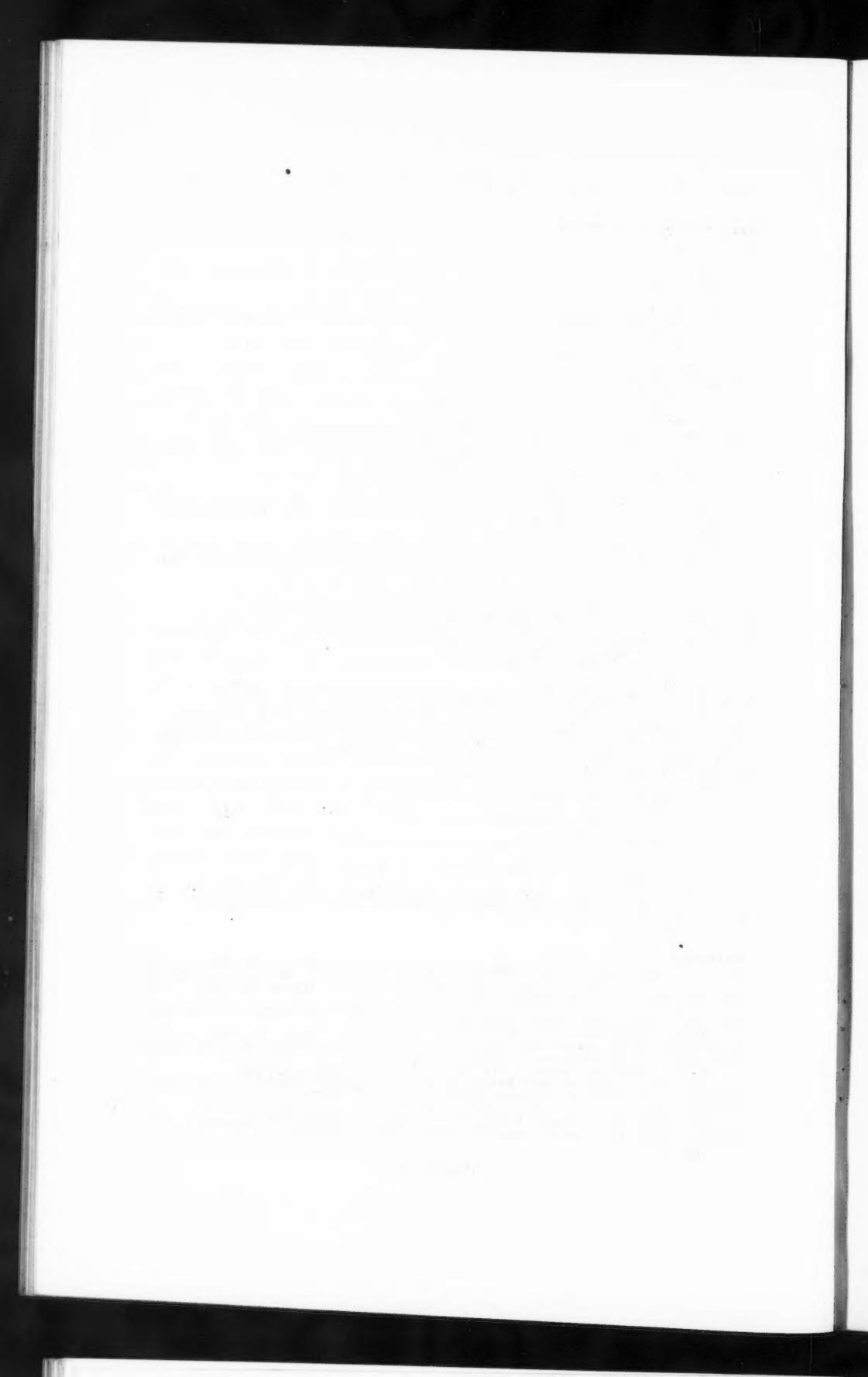


**Water Supply—(Continued).**

- Water Power Laws and Their Relation to Industry and Progress.\* F. Darlington. (9) Feb.
- Hydro-Electric Power in New Zealand.\* W. Wilson. (77) Feb. 1.
- Operating Characteristics of the Venturi Meter.\* Charles G. Richardson. (64) Feb. 1.
- Buffalo Completes Huge New Pumping Station.\* (13) Feb. 3.
- Otay Rock-Fill Dam Failure.\* Charles Whiting Baker. (13) Feb. 3; (14) Feb. 12.
- Why the Seattle Wood-Stave Water Pipe Failed.\* R. H. Ober. (13) Feb. 3; (86) Feb. 23.
- Water Consumption and Waste Prevention at Washington.\* (13) Feb. 3.
- Rapid Water Meter Testing.\* (13) Feb. 3.
- Important Canadian Water Power Questions. Arthur V. White. (Report to the Comm. of Conservation.) (96) Feb. 3.
- The Region of the Greatest Snowfall.\* Andrew H. Palmer. (From the *Monthly Weather Review*.) (19) Feb. 5.
- Steam Shovel, Crusher and Pumps put Hydraulic Fill in Dam.\* (14) Feb. 5.
- Hydroelectric Irrigation in Arizona.\* O. H. Ensign. (111) Feb. 5.
- Softening Water with Permutit.\* S. B. Applebaum. (From paper read before Newark, N. J., No. 3, N. A. S. E.) (64) Feb. 8.
- Upper Otay Concrete Arch Dam Stands Heavy Flood. (13) Feb. 10.
- A Composite Standpipe.\* (13) Feb. 10.
- Distribution Systems, Methods and Appliances in Irrigation. J. S. Dennis, H. B. Muckleston and R. S. Stockton. (Paper read before the Inter. Eng. Congress.) (96) Feb. 10.
- Grid Above Filter Surface Saves Wash Water.\* (14) Feb. 12.
- Some Suggestions Pertaining to the Operations of Water Works Plants. John W. Toyne. (Paper read before the Indiana San. and Water Supply Assoc.) (86) Feb. 16.
- Failure of the Lower Otay Dam.\* Roy A. Silent. (13) Feb. 17.
- Oldest Irrigation Conduit and Dam in the United States.\* (13) Feb. 17.
- Making and Laying Home-Made Pipe for Water Mains.\* (13) Feb. 17.
- Lost-Head Diagrams for Bends in Water Pipe.\* Ben Morcell. (13) Feb. 17.
- Water Powers in the Porcupine Area of Northern Ontario.\* (Report to the Bureau of Mines.) (96) Feb. 17.
- Working Air out of Pipe Line Tested in Long Sections. R. C. Hardman. (14) Feb. 19.
- Constructing a Small, Steel Water Supply Main in the Philippines. (86) Feb. 23.
- Tests of 18 000-Hp. Tallulah Falls Turbines.\* E. Lauchli. (13) Feb. 24.
- Some Better Kutter's Formula Coefficients. Robert E. Horton. (13) Feb. 24.
- Three-Level Concrete Conduit Design Outlined. Frederic H. Fay. (14) Feb. 26.
- Le Rôle de l'Utilisation des Chutes d'Eau dans la Reprise de l'Activité Industrielle et Agricole.\* Paul Lévy-Salvador. (92) Nov., 1915.
- Les Portes de l'Ecluse de Keokuk sur le Mississippi (Iowa, E.-U.).\* F. Hofer. (33) Jan. 22.
- L'Usine Hydro-Electrique de Porjus pour l'Electrification des Chemins de Fer suédois.\* (33) Jan. 29.
- Ueber Wasser und Wasserreinigung in Kopenhagen.\* Sverre Malm. (112) Serial beginning Nov., 1915.
- Die Wasserabgabe aus Talsperren mittels Kulissenschieber.\* Thürnau. (40) Nov. 6, 1915.
- Erwärmung des Wassers in Rohrleitungen.\* A. Thiem. (112) Serial beginning Nov. 16, 1915.
- Die hygienische Bedeutung guter Brunnen. Hugo Kühl. (39) Dec. 20, 1915.
- Beitrag zur Theorie des "gleichwertigen Querschnittes". Alfred Fröhlich. (7) Dec. 25, 1915.

**Waterways.**

- Experiments upon Mortar, and Diatomaceous Earth as Puzzolana, in Sea-Water; with Special Reference to Groyne in Denmark.\* A. Poulsen. (63) Vol. 200, 1915.
- The Economics of Ladder Dredgers and Steam Hoppers. Harold Berridge. (63) Vol. 200, 1915.
- The Improvement of the River Clyde and Harbour of Glasgow, 1873-1914. Thomas Mason. (63) Vol. 200, 1915.
- Improvement Works, Otago Harbour. John Blair Mason. (63) Vol. 200, 1915.
- Investigation of the International Joint Commission Upon the Pollution of Boundary Waters. Earle B. Phelps. (4) Nov., 1915.
- Canal Excavation with Electric Drag-Line Scrapers.\* (27) Jan. 29.
- Experience with Concrete Protected Timber Piles in Tropical Waters, at San Juan, Porto Rico.\* J. P. Carlin. (67) Feb.
- Floods in Southern California Summarized to Jan. 25. (13) Feb. 3.
- Guarding Steel Lock Gates from Galvanic Action.\* Edward C. Sherman. (13) Feb. 3.



**Waterways—(Continued).**

- Subaqueous Excavation at the Halifax Ocean Terminals.\* (13) Feb. 3.  
Study Silt Problem in Imperial Valley System. (14) Feb. 5.  
Is the Model Weir Unreliable? Ben D. Moses. (14) Feb. 6.  
Machine for Placing Concrete Lining in Canals.\* E. I. Davis. (13) Feb. 10.  
Concreting Plant for Halifax Ocean-Terminal Work.\* (13) Feb. 10.  
Father of Waters in Flood. E. M. Markham. (13) Feb. 10.  
Flood Control in Los Angeles County in California.\* (13) Serial beginning Feb. 10.  
Twelve 2 000-Ton Cribs for Welland Canal Completed.\* (14) Feb. 12.  
Cellular Type of Quay Wall at Halifax Terminals Compared with Other Designs.\*  
(14) Feb. 12.  
An Analysis of the Waterways Movement. H. G. Moulton. (18) Feb. 12.  
Ore Pier of the Lehigh Valley R. R. at Constable Hook, Bayonne, N. J.\* (18)  
Feb. 12.  
Control of Mountain Torrents by Check Dams.\* Frank H. Olmsted. (13) Feb. 17.  
Mississippi River Stages, 1915, and Hydrograph, 1861-1914.\* James W. Skelly.  
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\* Illustrated.